EFFECT OF TOTAL QUALITY MANAGEMENT PRACTICES ON THE OPERATIONAL RESILIENCE OF MANUFACTURING SMEs IN NAIROBI, KENYA

STACY NGENYI WAMBUA

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

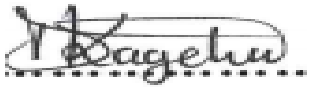
Name of Candidate: Stacy Ngenyi Wambua

Approval:

The dissertation of Stacy Ngenyi Wambua was approved by the following:

Name of Supervisor: Dr. Diana Ominde

School/Institute/Faculty: SBS



Dr. Ceaser Mwangi

Executive Dean

Strathmore University Business School.

Dr. Bernard Shibwabo

Director, Office of Graduate Studies

DEDICATION

This work is dedicated to my family, the Wambuas, for their unwavering support, encouragement, and belief in me, which has been the foundation upon which I have built this accomplishment. Thank you for your endless love and understanding throughout this journey. My friends, Nicholas and Alan for their constant companionship, insightful conversations, and moments of laughter providing a welcome respite and keeping me motivated and lastly**,** the Strathmore University staff**.** I am grateful for the guidance and expertise provided by the faculty and staff throughout my Master's program. Their dedication to student success has been invaluable.

ABSTRACT

Manufacturing SMEs often face constant challenges from the dynamic landscape of business. Since they are a crucial part of the economy, these SMEs need to be sustainable in the long run and go beyond performance, through recovery in the face of these disruptions, and put in place practices to help in mitigation for the future. The aim of this study was to ascertain the effects of Total Quality Management Practices adoption to the operational resilience of manufacturing SMEs. This study's main aim goal was to determine the impact of TQM practices implementation on the operational resilience of manufacturing SMEs in Nairobi. The research was achieved by studying the manufacturing SMEs registered in Nairobi County's licensing office, and the list was cross checked with KAM as of December 2018 within Nairobi, being a significant representation of SMEs in Kenya. The study utilized convergent mixed methods design and simple random sampling as well as purposive sampling because of the expected dynamic nature of the population in relation to the objective of the study, and the combination of the quantitative and qualitative aspect of the study. The study was guided by dynamic capabilities theory and resource orchestration theory. Primary data was collected from the participants through close-ended questionnaires and interview schedules, and analyzed through the latest version of the SPSS as well as through inductive coding. The population size was the 134 manufacturing SMEs in Nairobi, and the samples size was 100 manufacturing SMEs. Results indicate a strong association between employee involvement, top management commitment, supplier partnership and customer focus with operational resilience. The Analysis of Variance indicated Operational resilience across sectors of manufacturing SMEs was greatly attributed by Total Quality Management Practices adoption. TQM practices contribute to operational resilience for manufacturing SMEs by improving process efficiency, product quality, risk management capabilities, employee engagement, and supply chain relationships. SMEs can build resilience, adaptability, and sustainability in an increasingly uncertain business environment. TQM practices emphasize continuous improvement and optimization of processes by embedding TQM principles into their organizational culture and operations. The study serves as a strong starting point for scholarly investigations into operational resilience and TQM adoption in the manufacturing SME sector in the future. Knowledge gaps were addressed in the field because there has only been a limited amount of research on the adoption and implementation of overall quality management methods in the manufacturing SMEs industry in Nairobi. Manufacturing SMEs need to involve employee by providing comprehensive training programs to enhance employees' skills and knowledge related to resilience-building practices, such as problem-solving, decision-making, and adaptability. They also need to improve operational resilience through customer focus by conducting market research and gather feedback to understand customer preferences, expectations, and changing needs.

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LIST OF ABBREVIATIONS

TQM: Total Quality Management

SMEs: Small and Medium Enterprises

WEF: World Economic Forum

WBSMEF: World Bank SME Finance

KAM: Kenya Association of Manufacturers

DEFINITION OF TERMS

Total Quality Management: Al-Khaled (2019) refers to the practice where all members of the business collaborate in improving processes, products, services, and culture at all levels to ensure the organization's long-term objectives.

Small and Medium Enterprises: Those businesses with between 10 and 99 employees. Small businesses have 10 to 49 employees, whereas medium businesses have 50 to 99 employees (Kenyan SME Act, 2012)**.**

Employee Involvement: The process where employees are empowered to take part in managerial decision-making and development programs relevant to their roles inside a company (Chandani et al., 2016)

Top management commitment: Cimatti (2016) Refers to their active involvement in all crucial aspects of a company, including quality and programs.

Supplier partnerships: Alshurideh et al., (2019) refer to a comprehensive method for managing how a company interacts with the companies that supply its goods and services

Customer Focus: Refers to satisfying both current and future clients' needs by understanding their requirements and providing value they perceive as valuable (Sharabi, 2015).

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The modern business environment for manufacturing enterprises, particularly Small and Medium Enterprises (SMEs), is characterized by an increasing frequency of disruptions. Natural catastrophes, pandemics, economic crises, and political instability can all have significant effects on a business's ability to maintain operational continuity (Manhart et al., 2020; Haraguchi & Lall, 2016). In this context, operational resilience has emerged to be a vital concept for business survival and growth.

Operational resilience refers to a company's capacity to absorb disturbances and bounce back fast (Essuman et al., 2022: Li et al., 2022). It refers to an organization's ability to prepare for, respond to, and recover from unexpected events. This ability to withstand and bounce back from disruptions is particularly crucial for manufacturing SMEs in Africa, especially those in Nairobi. These businesses frequently operate with limited resources and navigate a fluctuating business environment, making them more susceptible to the negative effects of disruptions (Marks & Thomalia, 2017) The growing need for operational resilience indicates how vulnerable firms' operations are to disruption (Chen et al., 2022; Gerschberger et al., 2023; Jiang et al., 2023).

SMEs are especially vulnerable to crises and shocks, as shown by the 2008-2009 global financial crisis and the recent COVID-19 pandemic. SMEs worldwide, particularly in emerging and developing countries, lack the resources and skills to focus on maintaining business operations and managing crisis cultures, making them more prone to risks both internal and external, and destructive shocks (Marks & Thomalia, 2017). Kotsios (2023) emphasizes the necessity for SMEs, in particular, to respond to unforeseen shocks from the external environment, rapidly changing market conditions, and regulations, which will help the enterprises, survive crisis periods.

SMEs are the foundation of all economies and have become a dynamic and thriving industry globally (Gherghina et al., 2020). SMEs are crucial for achieving economic

growth because they innovate, create job opportunities, hone entrepreneurial skills, and aid social integration (Taneja et al., 2016). Rauch et al., (2019) report revealed that the manufacturing sector employed over 29 million people, with over 2 million businesses categorized as small and medium-sized. The World Bank SME Finance reports that around 10 million SMEs contribute 23% of the GDP, 80% of sector jobs, and 25% of the labor force (WBSMEF, 2023). Over 240,000 people are employed by manufacturing SMEs in Kenya, which represents 13% of total employment (Gathungu and Ndemo, 2021).

While previous research in the context of manufacturing SMEs in operations in Africa has made significant contributions to the field, the primary focus has been on operational performance. Operational performance focuses on how efficiently and effectively a company uses its resources to achieve its goals. It is often measured by metrics such as productivity, quality, cost, and delivery time (Slack et al., 2016). While both are crucial for success, operational resilience and operational performance in manufacturing SMEs are two distinct concepts. Operational performance reflects an SME's current or rather continuous efficiency in producing high-quality goods, meeting output targets and customer requirements. In contrast, operational resilience focuses on the SME's ability to adapt and uphold business continuity even during disruptions. It's about the agility and robustness of the system to handle unexpected challenges and maintain functionality.

Studies have explored how practices like Total Quality Management (TQM) can improve efficiency, quality, and overall performance within these firms (Saheo et al., 2018; Hilman et al., 2020; Kaur et al., 2014). This existing body of research provides useful insights into enhancing manufacturing processes within SMEs, and it suggests a positive relationship between specific TQM practices and operational performance in manufacturing SMEs (Saheo et al., 2018; Hilman et al., 2020; Kaur et al., 2014).

Top management commitment cultivates a quality culture and allocates resources for improvement, employee involvement enhances engagement and problem-solving abilities, strong supplier partnerships ensure high-quality materials and cost savings, and finally, focusing on customer needs reduces defects, increases satisfaction, and gives useful feedback for continuous improvement, all leading to greater efficiency, quality, and overall

operational performance within the SMEs. According to a study by Ufua 2023, the necessity of organizational members' commitment along with adequate leadership support in achieving sustainable kaizen practices, as well as the requirement to align these practices in the organization's operational process, cannot be overemphasized.

However, there exists a crucial gap in understanding how these businesses can build operational resilience to survive and thrive in an uncertain dynamic environment. This study explored the effects of employee involvement, top management commitment, supplier partnerships, and customer focus on the operational resilience of manufacturing SMEs in Nairobi, Kenya, as these TQM practices have been linked to operational performance in manufacturing SMEs. This study gave useful insights into how TQM practices contribute to a firm's ability to withstand and recover from shocks, hence improving the long-term sustainability and growth of these key economic drivers.

1.1.1 Total Quality Management Practices

TQM is a management concept used to boost business efficiency and competitiveness. Topalović (2015) highlights that TQM aims to help firms meet customer expectations by continuously enhancing quality and performance. TQM quality standards can range from soft to hard, depending on the amount of financial input. Soft variables include top management's commitment, staff empowerment and customer focus, whereas hard factors include those that make it possible to enhance the system and ensure quality (Keinan & Karugu, 2018).

Strategic planning, customer focus, dedication to leadership, and emphasis on human resource management was employed by Abbas and Kumari (2021) as TQM components, and these resulted to high operational performance. Process management, leadership management, and quality focus were employed by Tsou et al., (2021) as the three core TQM aspects, which also resulted to high performance levels of organizations. Al Zoubi et al., (2019) assert that the optimal techniques for TQM adoption in any health care context include collaboration, customer focus and commitment from senior management, process, and resource management, and that these concepts significantly impact the performance of these organizations.

Adiele and Eketu (2023) study revealed that employee involvement relates significantly to resilience of hotels in Port Harcourt. This study demonstrated a significant positive correlation between employee involvement and the resilience of hotels in Port Harcourt. Empowered employees are more likely to identify and address potential disruptions proactively, fostering adaptability and faster recovery (Tsou et al., 2021).

Basana et al., (2022) study found that top management commitment affects operational performance and it also improves operational performance indirectly. This study therefore highlights the positive influence of top management commitment on operational performance, which indirectly contributes to resilience. Strong leadership fosters a culture of continuous improvement and resource allocation for risk mitigation strategies (Al Zoubi et al., 2019).

Mwangi et al., (2021) study established that supplier collaboration had a statistically significant and positive effect on performance of retail stores. This study established a positive and statistically significant effect of supplier collaboration on retail store performance. Resilient SMEs require reliable and adaptable suppliers to minimize disruptions in the supply chain, a critical aspect of operational resilience (Rogoet et al., 2017).

Kangethe (2015) study investigated the relationship between customer quality focus and operational performance of government owned entities, and a relationship between the two was established. This study found a positive relationship between customer quality focus and the operational performance of government entities. Understanding and anticipating customer needs allows SMEs to adapt their offerings quickly during disruptions, minimizing customer dissatisfaction and maintaining market share (Al-Khaled, 2019). As a result, this study utilized comparable criteria to examine the effects of employee involvement, top management commitment, supplier relationships, and customer focus on the operational resilience of manufacturing SMEs in Nairobi.

Total Quality Management (TQM) is a contemporary management approach that integrates strategy, practice, and organizational outcomes to build a successful company that continually enhances and sustains performance (Al-Khaled, 2019). TQM's impact on SME operational performance is crucial, but modern business environments demand a broader perspective beyond efficiency measurements. Operational resilience, the ability of an organization to adjust, recover, and thrive amidst shocks and uncertainties, has become a distinguishing characteristic of sustainable and successful business.

The global risk landscape is said to be more complicated and unpredictable than ever in 2021 and onwards, (WEF, 2021). Globally, the risk environment has shifted significantly, presenting unprecedented shocks and challenges for business executives to prepare for this future. Regionally, Rogoet et al., (2017) study in Nigeria, on the adoption of TQM by SMEs, concluded that TQM is an operational choice that can improve their efficacy and competitive edge. South Africa's Beraki et al., (2022) recommend that SMEs strongly support the implementation of TQM for sustainable growth and continuous improvement. Locally, research conducted by Wanjau et al., (2013) on the impact of quality on growth of SMEs in Kenya indicated that those that adopt quality succeed. Presently, there is little research on the relationship between TQM and operational resilience of manufacturing SMEs, notably in Nairobi. Data on resilience is insufficient as most of the information provided focuses on performance. This study therefore aimed to explore the effect of TQM practices gherghinaon operational resilience in Kenyan manufacturing SMEs, in Nairobi.

1.1.2 Operational Resilience

The dynamic landscape of business presents a constant challenge for manufacturing SMEs. Disruptions, such as natural catastrophes and economic crises, as well as breakdowns in supply chains and technology developments, can have a substantial impact on a SME's capacity to function effectively, potentially resulting in financial losses, production delays, and even closure (Singh & Singh, 2018).

Operational resilience has emerged as a critical concept for SMEs. It refers to an organization's capacity to anticipate, prepare for, respond to, and recover from disruptions (Sheffi, 2013). A resilient organization can absorb shocks, adapt to changing circumstances, and continue operating effectively while minimizing the impact of

disruptions (Wieland & Handfield, 2013). Because of their inherent vulnerabilities, SMEs require higher levels of operational resilience. When compared to larger enterprises, SMEs frequently have limited resources, such as financial reserves, diverse supplier bases, and advances in technological infrastructure. These limitations can make them more susceptible to disruptions and hinder their ability to recover quickly (Nyamboga & Ali, 2021).

Previous Studies have highlighted the devastating effects of disruptions on SMEs. The COVID-19 pandemic serves as a prime example of disruptions. Many SMEs faced challenges such as supply chain breakdowns, cash flow issues, and labor shortages, leading to closures or significantly reduced operations (Baldwin, 2020).

Building operational resilience is more than just reacting to disruptions. It requires a proactive approach that encompasses various capabilities such as continuous identification of potential threats and their likelihood of occurrence (Sheffi, 2013), implementation of proactive measures to minimize the impact of potential disruptions (Pettit et al., 2020), development of well-defined plans for effectively responding when disruptions occur (Wieland & Handfield, 2013), and the ability to adjust processes, resources, and strategies to navigate changing circumstances (Pettit et al., 2020), and continuously monitoring performance and identifying areas for improvement in resilience capabilities (Sheffi, 2013).

By developing these capabilities, SMEs can improve their preparedness and capacity to handle the ever-changing business landscape. Operational resilience is a vital concept for manufacturing SMEs in Nairobi, and by understanding the concept and its importance, as shown in recent studies, SMEs may make proactive efforts to strengthen their resilience and assure their sustainability in the event of disruption.

1.1.3 Small and Medium-Sized Enterprises in Kenya's Manufacturing Industry

Kenyan SME Act (2012) defines SMEs as businesses with 10 to 100 employees. Manufacturing firms are defined as those engaged in value addition via the processing of raw materials (KAM, 2018). Kenya's manufacturing industry comprises 13 sub-sectors

including furniture, leather and footwear, metal, food, and beverages, chemical, energy, electrical, and electronics, building, and mining, motor vehicles, pharmaceutical and medical equipment, plastic and rubber, textile, and building materials. In Nairobi county, the number of SMEs registered with KAM are 134, belonging to the 13 sub-sectors.

SMEs are a crucial part of Kenya's manufacturing industry, contributing significantly to job creation and industry innovation. The Central Bank of Kenya's National Economic Survey recent report reveals that SMEs make up 98% of Kenya's businesses, generate 30% of employment annually, and contribute 3% to the country's GDP. A 2018 Kenya National Bureau of Statistics survey revealed that only a small percentage of SMEs reach their fifth birthday, raising concerns about the sustainability of this vital sector. The Central Bank of Kenya's then-Governor Patrick Njoroge noted in 2018 that 46% of Kenya's SMEs shut within a year of creation.

SMEs nowadays cannot overlook the strategic implications of quality for their market position. Wanjau et al., (2013) found that SMEs often lose 5% to 15% of their sales income due to lack of attention to quality, but those dedicated to quality achieve better results. The effectiveness of SME manufacturing enterprises has been proven to be positively impacted by TQM methods such continuous improvement, staff training, top management commitment, and customer focus (Dhieu, 2019). The implementation of TQM methods, such as customer focus, top management commitment, continuous improvement, and staff participation, has a good and substantial impact on operational performance (Keinan & Karugu, 2018). This research aimed to fill a gap in existing literature by examining the impact of TQM procedures on operational resilience of the manufacturing SMEs in Nairobi.

1.2 Statement of the problem

Manufacturing small and medium-sized firms (SMEs) are the backbone of Nairobi's economy, yet they frequently face significant operational challenges (Macharia & Mwangi, 2013). Unlike larger corporations, SMEs often lack the resources and flexibility to navigate the dynamic and competitive environment of Nairobi (Nyamboga & Ali, 2021). These SMEs often face challenges and disruptions which include, supply chain interruptions, economic downturns, technological advancements, and even natural disasters, which can severely impact these firms (Omwenga et al., 2018).

Previous studies highlight significant vulnerabilities that hinder resilience in Nairobi's manufacturing sector. One of the challenges is overdependence on single suppliers, which results in a single point of failure, which in turn magnifies the impact of disruptions (Ndirangu et al., 2021). Another challenge is limited financial buffers, and these SMEs have been found to have no sufficient cash reserves to endure economic downturns or invest in new technology to adapt (Macharia & Mwangi, 2013). Also, outdated equipment and limited digital adoption can hinder agility and responsiveness to disruptions (Omwenga et al., 2018). These vulnerabilities have a domino-effect, and they often result to stoppages and interference in production, lost revenue, and ultimately, business failure (Karuri et al., 2017). This vulnerability was clearly demonstrated and magnified by the recent COVID-19 pandemic, which adversely affected SMEs compared to larger organizations due to their lower capital reserves and productivity capacities (Nyamboga & Ali, 2021).

While Total Quality Management (TQM) practices have demonstrably improved manufacturing processes (Macharia & Mwangi, 2013), their impact on operational resilience in Nairobi's SME context remains under-explored. Existing research in Kenya, such as the one by Macharia & Mwangi (2013), highlights the positive effects of TQM on quality improvement and efficiency within manufacturing firms. However, the specific contribution of TQM practices to building resilience against disruptions in Nairobi based manufacturing SMEs is a crucial gap in knowledge.

This research aimed to address this critical knowledge gap by investigating the effect of TQM practices on the operational resilience of manufacturing SMEs in Nairobi. It explored

how specific TQM practices, which include employee involvement, top management commitment, supplier partnerships, and customer focus, contribute to building a more resilient manufacturing SME sector in Nairobi. Comprehending and understanding these relationships will be essential for developing focused strategies and enhancing the overall competitiveness of Nairobi's vital manufacturing sector amidst continuous disruptions.

1.3 General Objective

In this study, the main objective was to determine the effect of TQM practices on the operational resilience of manufacturing SMEs in Nairobi. This study aimed to explore the enhancement of operational resilience of manufacturing SMEs in Nairobi by implementing TQM practices in the face of disruptions in the current turbulent business environment.

1.3.1 Specific Objectives

I. To find out the effect of employee involvement on operational resilience in manufacturing SMEs in Nairobi.
II. To investigate the effect of top management commitment on operational resilience in manufacturing SMEs in Nairobi.
III. To examine the effect of supplier partnerships on the operational resilience in manufacturing SMEs in Nairobi.
IV. To investigate the effect of customer focus on the operational resilience in manufacturing SMEs in Nairobi.

1.4 Research Questions

To achieve the research objectives, the following research questions guided the study:

1. What is the effect of employee involvement on the operational resilience of manufacturing SMEs in Nairobi?
2. What is the effect of top management commitment on the operational resilience of manufacturing SMEs in Nairobi?
3. What is the effect of supplier partnership on the operational resilience of manufacturing SMEs in Nairobi?
4. What is the effect of customer focus on the operational resilience in manufacturing SMEs in Nairobi?

1.5 Scope of the Study

Geographically, the scope of the study analyzed 134 manufacturing SMEs registered with KAM in Nairobi. The study focused on how the adoption of employee involvement, top management commitment, supplier partnerships, and customer focus influence the operational resilience of manufacturing SMEs in Nairobi, that practice TQM, contextually. The conceptual scope includes the understanding and examination of the mentioned TQM practices, operational resilience and the interplay between these variables, in the context of manufacturing SMEs in Nairobi. The methodological scope includes the application of both quantitative and qualitative methods, and the time scope was from January to April 2024.

1.6 Significance of the Study

Results of the study advanced both practical application and scholarly understanding in the industry. To the policy makers, the study enhances informed decision making. The information gathered can be leveraged in order to develop policies that support and promote TQM adoption in manufacturing SMEs in Nairobi, potentially enhancing the industrial sector's overall resilience.

To the industry players, the study could potentially enhance operational improvement. A deeper knowledge of how TQM methods promote operational resilience can benefit industry partners, particularly manufacturing SMEs and other stakeholders. The study's findings can potentially assist industry partners refine their strategy, build a quality management culture and form effective collaborations with employees, customers and suppliers.

To academia, the study contributes to the body of knowledge. The study contributes to the empirical data to the academic community's understanding of the relationship between TQM techniques and operational resilience in a specific setting, in Nairobi County. The study could serve as a foundation for future academic investigations, adding to the body of knowledge in the domains of quality management, operational resilience and SME studies.

1.7 Chapter summary

There are six main sections in this chapter. Section One begins with an introduction that covers the study's variables in sequential order. The problem statement and the research gap are developed in Section two. The third section outlines the study's objectives, emphasizing both the general and specific objectives. The research questions are presented in Section four. Section five outlines the study’s scope and section six which focuses on the study's significance, brings the chapter to a close.

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical Framework

This chapter of the study included the theoretical sections and empirical review sections. The study centered on the Dynamic Capabilities Theory and the Resource Orchestration Theory, with the empirical section presenting results from a literature review on the study variables.

2.1.1 Dynamic Capabilities Theory

Dynamic Capabilities Theory emphasizes an organization's ability to sense, seize, and reconfigure resources in response to a dynamic environment (Teece, Pisano, & Shuen, 1997). According to this theory, a firm's competitive advantage is dependent on its ability to sense, which is to identify and anticipate external and internal changes that may impact performance; seize, which is to recognize and capitalize on new opportunities arising from these changes; and reconfigure, which is to adapt, combine, and leverage existing resources to address these changes and exploit opportunities.

TQM principles, which emphasize continuous improvement, learning agility, and customer focus, complement these key DCT attributes. Implementing TQM principles assists SMEs in developing sensing capabilities, which includes regularly monitoring customer wants, competition activity, and market developments via data gathering and staff feedback systems (Chen, Yang, & Huang, 2013). To seize, which entails identifying potential disruptions or opportunities for improvement using problem-solving techniques and employee suggestions (Akbar et al., 2018), and to reconfigure, which entails adjusting production processes, resource allocation, and supplier relationships to maintain operational continuity and respond to changing demands (Yildiz, 2015).

Employee involvement through training increases the diversity of perspectives available to identify possible disruptions and areas for improvement, hence broadening the skill sets of employees (Ufen, 2020), and increased decision making, fosters sharing of knowledge and collaborative problem-solving, which leads to a more proactive strategy for managing

disruptions (Agyapong et al., 2013). A very practical example is that Employee involvement can be extremely beneficial in identifying any disruptions caused by transportation problems or power shortages, which are frequent problems for SMEs in Africa (World Bank, 2023). This enables sensing of disruptions and proper actions are sought out as fast as possible.

This proactive approach to employee empowerment enhances the SME's ability to detect disturbances early and capitalize on possibilities for improvements. Employee involvement also leverages the workforce's cumulative knowledge and expertise, allowing for the creation of innovative solutions to overcome disruptions and adapt production processes (Wieland & Durand, 2013). This collective intelligence strategy improves the SME's ability to effectively reorganize and reconfigure resources during disruptions.

Top management's operational competency and full participation in TQM implementation demonstrate a commitment to continuous improvement. This leadership sets the tone for the organization, encouraging risk assessment and proactive planning for these SMEs (Joshi & Sharma, 2019) Understanding operational strengths and weaknesses specific to African SMEs such as over reliance on local suppliers and limited access to technology, allows top management to seize opportunities to build resilience through investments in training, alternative sourcing strategies, or contingency plans for infrastructure disruptions (Brem & Kabanda, 2014).

Visible leadership commitment to TQM principles, gives strategic direction and effective allocation of resources, enabling the reconfiguration of resources to enhance operational resilience (Azzolini et al. 2015). Leaders who advocate TQM concepts emphasize the value of continuous enhancement and operational excellence. This gives a clear vision and strategic direction for staff, motivating them to focus on resilience-building initiatives (Yildiz, 2015).

African manufacturing SMEs are able to reconfigure their supply chains and obtain essential resources even in the face of disruptions when they have established excellent communication, reliability, and trust with local and regional suppliers (Ahuja & Chan,

2017). Collaborative relationships with suppliers can facilitate joint contingency planning and alternative sourcing strategies specific to the African context, enhancing a firm's ability to adapt to disruptions like trade restrictions or border closures (Bahonza & Mukanduri, 2018). This could include finding alternate suppliers, storing essential commodities, or creating flexible supply schedules (Handfield & Nichols, 2019). When these SMEs have these strong relationships with suppliers, they are able to effectively reconfigure their resources towards resilience. To ensure operational continuity, such joint initiatives make it easier to reconfigure sourcing resources.

Such collaboration also improves information exchange and shared problem solving, allowing for improved identification of supply chain failures and reconfiguration of sourcing strategies to ensure operational continuity (Handfield & Nichols, 2019). Strong supplier connections enable information sharing about potential disruptions, such as material shortages or production delays, at the supplier level. This early warning system helps the SME detect potential dangers to its operations (Christopher & Holweg, 2011). Furthermore, collaboration with suppliers enables cooperative coordinated contingency planning to limit the impact of disruption.

Businesses can identify shifting consumer demands during disruptions specific to Africa by implementing continuous improvement techniques and providing opportunities for customer feedback. Understanding and responding to changing customer needs enables SMEs to adjust their production processes and resource allocation to meet shifting demands (Lin et al., 2018). By concentrating on consumer demands and feedback, SMEs can recognize new trends and tailor their products and services accordingly (Lin et al., 2018). This flexibility improves the SME's capacity to seize new opportunities and restructure resources to meet changing market demands, even amid disruptions, hence increasing market adaptability. Also, strong customer relations built on constant quality and responsiveness help mitigate the effects of disruptions. Loyal clients may be more understanding of minor delays or product changes during difficult times (Christopher & Holweg, 2011). This contributes to operational continuity by reducing the negative impact of disruptions on sales and revenue.

This theory proves useful in this study since it informs the research on the relationship between the selected TQM practices and operational resilience, and shows how manufacturing SMEs can use TQM practices to anticipate disruptions, identify opportunities, and adapt their operations to maintain continuity and competitive advantage even during challenging times.

2.1.2 Resource Orchestration Theory

Resource Orchestration Theory focuses on the strategic configuration and utilization of resources to gain a competitive advantage (Barney, Wright, & Ketchen, 2001). Wieland and Durand's Resource Orchestration Theory (ROT) 2013, provides another valuable perspective. ROT focuses on how organizations employ their resources (financial, human, and technological) to respond to interruptions and maintain essential operations.

It focuses on how firms orchestrate their tangible (e.g., equipment) and intangible (e.g., knowledge) resources to create value (Barney et al., 2001), and emphasizes three key capabilities which include: First, resource configuration, where existing resources are **i**dentified and combined in unique ways to create a competitive edge. Second, resource leveraging where resources are utilized effectively to maximize their value and contribution to performance, and finally, dynamic capabilities referring to the capacity to identify and capitalize on opportunities by reconfiguring resources in response to a changing dynamic environment.

In the face of disruptions, African manufacturing SMEs seek to gain a competitive advantage through operational resilience. Operational resilience encompasses a firm’s ability to maintain the continuation of operations despite disruptions, minimizing and acting fast upon downtime and ensuring ongoing production process or the delivery of services (Chen et al., 2022). It also encompasses a firm’s ability to respond effectively to disruptions with minimal delay, thus demonstrating adaptability and a rapid recovery process (Li et al., 2022). It also entails a firm’s ability to adapt flexibly to the ever changing circumstances, including economic fluctuations, infrastructural limitations, or trade disruptions specific to the African business environment (Manhart et al., 2020). Operational resilience indeed requires a well-balanced orchestration of resources.

These resources may include human capital, who bear the knowledge and skills required to respond to disruptions while considering the unique circumstances of the SME. For example, problem-solving for limited access to technology and finding ways of being adaptable to infrastructural deficiencies. When compared to developed economies, SMEs operating in Africa may have limited technological resources. ROT therefore highlights the importance of making the most out of the resources already in place.

Low-cost technologies appropriate for the local context can be utilized to carry out operations in the SMEs (Brem & Kabanda, 2014). Relying on technologies that are readily available and affordable minimizes disruptions that can be caused when complex or expensive technologies that may be difficult to maintain or replace are relied upon. Also, putting a focus on technologies that are best suited for the local infrastructure and skills enables firms adapt more readily during disruptions.

For data storage and remote work or rather collaboration, cloud-based solutions can be leveraged, and this can be done even with limited internet bandwidth (Akter et al., 2018). These cloud-based solutions ensure critical data such as customer data or production schedules is accessible even when local IT infrastructure has been compromised by disruptions. Also, communication and collaboration is enhanced for remote teams, allowing fast decision making and solving of problems during disruptions. Mobile technology solutions for communication, inventory management, customer outreach and other tasks can be implemented (Onwutalor, 2020). This allows for faster coordination and response time amongst various stakeholders. Also for improved visibility and control, such solutions can provide real-time data allowing for better making of decisions regarding production adjustments or alternative sourcing of materials.

Manufacturing SMEs may build operational resilience and meet the ever-changing demands of their environment by effectively integrating these resources. Using the resources at hand to optimize their influence on operational resilience is the main goal of ROT, rather than possessing the most advanced resources.

TQM concepts, with their emphasis on continuous enhancement and process optimization, are consistent with the key concepts of Resource Orchestration Theory. Implementing TQM practices helps SMEs develop the capabilities to identify valuable resources**,** and this is made possible through data collection and employee feedback mechanisms, TQM uncovers hidden strengths within the organization (Chen et al., 2013). This facilitates the identification of underutilized resources that can be configured for improved performance.

Early warning systems utilize employee feedback channels to identify possible problems early on, allowing for proactive resource allocation to prevent disruptions (Chen et al., 2013). Second, continuous improvement approaches promote flexibility in resource allocation and production processes. This allows SMEs to quickly change operations amid disruptions while maintaining continuity (Yildiz, 2015). Finally, TQM fosters supplier partnerships and collaborations, resulting in cooperative contingency planning and alternate sourcing methods, which improve resource flexibility in the event of interruptions (Handfield & Nichols, 2019).

While Resource Orchestration Theory research has generally focused on competitive advantage, previous studies have investigated its relationship with operational resilience. For example, Wieland and Durand (2013) explored the importance of resource orchestration in increasing manufacturing enterprises' resilience to natural disasters. Their findings revealed that organizations with excellent resource orchestration capabilities were better able to recover from disruptions via effective resource allocation and reconfiguration.

Several studies explored the positive effects of TQM and resource orchestration on operational resilience in manufacturing SMEs. Lin et al. (2018) investigated the role of TQM in improving the operational resilience of manufacturing SMEs in China. Their research demonstrated how TQM techniques supported resource allocation decisions based on customer needs, hence contributing to resilience during economic downturns. Similarly,

Yildiz (2015) discovered that TQM methods improved an SME's ability to reconfigure resources and adjust production processes during disruptions.

TQM benefits SMEs by encouraging effective resource configuration, leveraging, and dynamic capabilities. This study therefore highlighted the importance of TQM as a strategic strategy for improving operational resilience within manufacturing SMEs and sought to find comparable linkages with Nairobi-based manufacturing SMEs.

2.2 Empirical Review

2.2.1 Employee Involvement on operational resilience

Chandani et al., (2016) define employee involvement as the process where employees are empowered to take part in managerial decision-making and development programs relevant to their roles inside a company. Employee involvement involves providing workers with increased autonomy, control, authority, and decision-making power, which boosts their commitment, motivation, and job satisfaction. Employee involvement is important for implementing process approaches, continuous improvement, system approaches to management, and factual approaches to decision-making (Bakotic & Rogosic 2018). Employees are a valuable source of information and concepts, boosting productivity and providing necessary tools for positive change within a company.

A study by conducted by Zhang & Liu (2018) in China found that employee involvement, operationalized through various TQM practices like participative decision-making and continuous improvement initiatives, played a significant role in enhancing operational resilience in manufacturing SMEs. Employee engagement, fostered by these practices, acted as a mediator in this relationship. When employees felt involved and engaged, they were more likely to adapt to disruptions, propose solutions, and contribute to maintaining operational efficiency. The current study sought to found of a similar relationship in Nairobi’s manufacturing SMEs.

Sharma & Kumar (2020) study that used a case study approach in Indian manufacturing SMEs highlighted that high-performance work practices, which often include elements of

employee involvement like knowledge sharing, open communication, and teamwork, contributed to supply chain resilience. When employees were empowered to participate in problem-solving and decision-making related to supply chain disruptions, they helped the SMEs adapt and find alternative solutions more effectively. This study sought to explore whether Nairobi's manufacturing SMEs had a similar relationship.

The Gu et al., (2023) study looked at how 206 Chinese manufacturing companies' operational performance and supply chain resilience were affected by high-involvement human resource management. The study, using structural equation modeling, found that employee engagement significantly enhances supplier, customer, and internal resilience. Additionally, it was shown that employee skills enhance operational effectiveness by promoting internal and external resilience, enabling high-level employees to handle production line stagnation, maintain customer cooperation, and secure more orders. Despite the established link between employee engagement and enhanced supplier, customer and internal resilience, a notable gap exists concerning the specific examination of employee involvement and its direct impact on operational resilience, and this current study sought to address this gap.

Adiele and Eketu (2023) studied employee involvement and resilience of hotels in Port Harcourt. The study revealed that employee involvement relates significantly to resilience. According to the study, hotels ought to develop other strategies that can prevent and prepare the business to withstand business disruptions. This study focused on the hotel industry as opposed to the current study which focused on manufacturing SMEs thus presenting a contextual gap.

Agyapong et al (2013) examined how practices like participative decision-making and employee empowerment contributes to operational resilience of manufacturing SMEs in Ghana. Their findings revealed that employee involvement fosters a culture of continuous improvement and problem-solving, which enhances a firm's ability to adapt to disruptions and maintain operational continuity.

Bahonza and Mukanduri (2018) study highlighted the importance of employee involvement fostered by TQM practices. The study pointed out that employee participation in decision-making and problem-solving helps firms anticipate and respond effectively to disruptions within the supply chain, contributing to operational resilience.

Chesoli (2018) examined the effect of employee involvement in decision making on performance of selected SMEs in Kitale. The study highlighted that Kenyan SMEs should pay attention to human resource management practices which have been largely ignored, as increasing employee involvement in decision making positively impacts their growth and potential for survival. Despite the recognition in the literature that increasing employee involvement in decision-making positively impacts the growth and survival of Kenyan SMEs, there is a notable geographical gap, and a focused investigation was needed to understand the dynamics within manufacturing SMEs in Nairobi County, which this study aimed to investigate.

2.2.2 Top Management Commitment on operational resilience

Cimatti (2016) defines top management commitment as their active involvement in all crucial aspects of a company, including quality and programs. To attain customer satisfaction, top management commitment enables staff empowerment and greater work satisfaction through leadership. Additionally, it ensures that aims and policymaking are tailored based on the organizations internal and external environment and the company's business processes are interconnected with both internal and external partners (Leksono et al., 2020). Top management plays a major part in key company decisions. The success of any important decision in a company is strongly dependent on senior management's support and commitment (Zakuan et al., 2012). A well communicated quality policy and a quality management system must be developed, and top management must guarantee that the entire process is regularly monitored and assessed (Oruma, et al., 2014). Because of this, senior management support is essential to TQM procedures. Prior research has concentrated on how top management commitment affects operational performance.

A study by Fahimnis et al., (2021) in Indonesia investigated the relationship between top management commitment and operational resilience of manufacturing SMEs in a disrupted

environment and it was found that top management commitment has a positive and significant impact on operational resilience in manufacturing SMEs. They also identify supply chain agility as a mediating factor. This means that top management commitment fosters practices that enhance supply chain agility, which in turn strengthens operational resilience. The current study sought to explore of a similar and direct relationship in regards to manufacturing SMEs located in Nairobi.

Basana et al., (2022) study investigated the impact of top management commitment to enhance operational performance through green purchasing and green production practices in the manufacturing industry in East Java, Indonesia. The result revealed that top management commitment affects operational performance as well as green purchasing and green production, and that top management commitment also improves operational performance indirectly. The literature shows the influence of top management commitment on operational performance and green practices in the manufacturing industry in East Java, Indonesia, hence posing a significant research gap in the examination of the impact of top management commitment specifically on the operational resilience of manufacturing SMEs in Nairobi county, Kenya. While not explicitly mentioning operational resilience, improved performance contributes to an SME's ability to handle disruptions and adapt to changing circumstances.

Research by Sahoo and Yadav (2018) looked at the relationship between 127 Indian manufacturing SMEs' performance and several quality management factors. According to the survey, top executives need to be highly skilled in TQM ideas in order to successfully influence people, advance organizational objectives, and improve performance. Leaders' commitment to the organization boosts employee motivation to achieve goals, ensuring quality and consumer needs are prioritized in all efforts.

Mthembu et al., (2020) study investigated the role of leadership and organizational culture in building operational resilience in manufacturing SMEs. Their findings suggested that strong leadership commitment fosters a proactive organizational culture that emphasizes

risk management and adaptation. This, in turn, strengthens operational resilience, allowing SMEs to respond effectively to disruptions.

Wangui's 2018 study examined how TQM practices affected the operational performance of Nairobi-based food manufacturing firms. The study employed multiple regression analysis to investigate how TQM adoption affected operational performance and found a significant relationship between the two. Additionally, the outcomes demonstrated that across all TQM practices, top management commitment had the strongest association with performance.

Research on top management commitment's impact on operational performance is extensive, but there is a significant knowledge gap regarding its impact on an organization's operational resilience, specifically to manufacturing SMEs in Kenya, and in Nairobi in particular. Management commitment boosts agile supply chain initiatives by communicating vision, encouraging innovative problem-solving, and providing coaching, resulting in a committed and flexible staff. As a result, operational resilience was the main emphasis of this research.

2.2.3 Supplier partnerships on operational resilience

According to Alshurideh et al., (2019), Supplier relationship management is a comprehensive method for managing how a company interacts with the companies that supply its goods and services. Increasing the effectiveness of procedures between a firm and its suppliers is the aim of supplier relationship management.

A study by Falasca et al., (2019) explored the relationship between supplier integration and operational resilience in the electronics industry, where SMEs are prominent players. The findings were that supplier integration significantly improved a firm's operational resilience. SMEs that actively integrated with their suppliers experienced better responsiveness to disruptions, faster recovery times, and improved overall supply chain performance. This highlighted the role of supplier partnerships in enabling SMEs to adapt and absorb disruptions more effectively. This study sought to explore of a similar relationship to manufacturing SMEs in Nairobi, Kenya.

Nenavani & Jain's (2022) research looked into how supply chain responsiveness affects operational success in India's manufacturing industry. They found that strategic supplier partnerships and customer connections had an impact on supply chain responsiveness. According to the findings, strategic supplier partnerships and customer interactions improve supply chain responsiveness, subsequently enhancing operational performance. A firm's supplier relationships are influenced by factors such as better coordination, early involvement of suppliers in product development, and cooperation. The research suggests that manufacturing managers should invest in key suppliers and develop responsive strategies to enhance their ability to handle environmental volatility.

Strategic supplier partnerships were found as a link between numerous supply chain management components and their impact on the performance of Pakistani pharmaceutical manufacturing firms in Memon et al., 35 pharmaceutical businesses study in 2018. The findings revealed a substantial link between strategic partnerships with suppliers and pharmaceutical manufacturing company success. The report highlights that supplier partnerships involve collaboration between multiple businesses to support each other in critical areas such as product development, production, marketing, and distribution.

The collaboration with suppliers and information integration, according to Khan et al., (2015), influences the firm's performance. As a result, this research looked to examine if operational resilience and supplier partnerships have a comparable association.

Agyapong et al. (2018) study posit that supplier integration fosters operational resilience. Their research focused on supply chain visibility as a moderator of this relationship. They propose that strong supplier integration leads to improved information sharing and transparency, ultimately enhancing visibility within the supply chain. This increased visibility allows SMEs to anticipate disruptions more effectively, collaborate with suppliers on solutions, and adapt their operations more readily. The study contributes to the understanding of how supplier integration combined with supply chain visibility strengthens the resilience of African manufacturing SMEs.

Mwangi et al., (2021) study investigated the relationship between supplier collaboration and retail stores performance in Nairobi County, with the intervening role of supply chain resilience. The findings established that supplier collaboration had a statistically significant and positive effect on performance of these stores, and that supply chain resilience has a significant intervening role in the relationship between supplier collaboration and performance of retail stores in Nairobi therefore, enhancing supplier's chain resilience through supplier collaboration significantly contributes to performance of retail stores in Nairobi. This particular study aimed to bridge the significant contextual gap in the investigation of how supplier partnerships specifically affect the operational resilience of manufacturing SMEs in Nairobi County.

2.2.4 Customer focus on operational resilience

According to Sharabi (2015), customer focus is satisfying both current and future clients' needs by understanding their requirements and providing value they perceive as valuable. Sharabi (2015) states that a customer-focused approach should produce value for customers, who will then become devoted clients who will increase firm profitability. To thrive in a globalized market, firms must prioritize customer satisfaction through consumer focus techniques, establishing connections between internal procedures and customer needs.

Today's corporate operations should take this important quality management component into account. To do this, operational resilience must be designed with customer needs at the core. To effectively deliver on their customer promise, businesses must view their products and services from a customer perspective. A customer-centric resilience strategy helps firms establish trust, make real-time, data-driven decisions, and address potential problems before they impact customers, preventing service interruptions. There was a knowledge vacuum about how customer focus affects operational resilience, notwithstanding previous studies on the impact of customer focus on operational performance.

Wang et al., (2020) investigated the relationship between customer focus (operationalized as customer orientation) and operational resilience in manufacturing SMEs in China. The

study revealed that customer orientation practices like actively seeking customer feedback, building strong customer relationships, and focusing on customer satisfaction mediated the relationship between TQM practices and operational resilience. In other words, strong customer focus practices helped translate the benefits of TQM into improved operational resilience for the SMEs. This current study sought to investigate a similar and direct relationship, in Nairobi based manufacturing SMEs.

Huo et al., (2023) studied the impact of supply chain resilience on customer satisfaction and financial performance of 206 Chinese manufacturers. The findings show that supply chain resilience is positively related to customer satisfaction whereas customer resilience has no direct contribution to financial performance. This study aimed to conduct a similar study, with emphasis on the effect of customer focus on operational resilience, in the context of manufacturing SMEs in Nairobi County, bridging the contextual and geographical gap.

255 SMEs in Ghana's east area was examined in a research by Kwabena (2023) to determine the effect of customer focus on performance. The findings of this study indicate that a customer-focused strategy significantly improves SME performance. The study confirms the positive impact of customer-focus on SME success, indicating a significant correlation with customer, financial, internal business processes, and learning and growth performance. This study aimed to bring a fresh perspective by examining the critical TQM practice of customer focus in the context of resilience of Kenyan manufacturing SMEs.

Adu et al. (2018) study examined the mediating role of customer focus on the relationship between TQM practices and firm performance in manufacturing SMEs in Ghana. It was found that customer focus practices, such as gathering customer feedback and continuously improving products/services based on that feedback, mediated the positive association between TQM and performance. This suggests that strong customer focus allows SMEs to translate the benefits of TQM into improved performance, even in a challenging environment like Ghana.

Kangethe (2015) study investigated the relationship between customer quality focus and operational performance of Kenyan Government owned entities. The study concluded that customer quality focus influences the operations of commercial government owned entities in Kenya to the point of enabling the organization to focus on core competencies of business and improving services. This current study aimed to conduct a similar study, with emphasis on the effect of customer focus on operational resilience, in the context of manufacturing SMEs in Nairobi County.

2.3 Research Gap

Following the empirical review, several research gaps as follows were identified.

Sutrisino (2019) looked into the relationship between the operational, organizational, and total quality management elements in SMEs that manufacture food. In the Republic of Indonesia's East Java Region, 136 SMEs engaged in the food production industry provided empirical data. This research demonstrates how the elements "Soft" and "Hard" have an impact on enhancing operational performance. Operational performance has an impact on TQM and the accomplishment of organizational performance. "Hard" and "Soft" TQM are insufficient for SME businesses to reap the benefits and gain long-term competitive advantages; instead, a quality-oriented corporate culture is required to take on these issues. Therefore, this study sought to determine whether these TQM practices have an effect on the operational resilience of manufacturing SMEs and in this case, those in Nairobi, Kenya.

Hilman et al., (2020) investigated the relationship between TQM and SMEs' performance: The mediating role of organizational culture. A self-administered questionnaire was used to collect data from managers/owners of SMEs in the Riyadh, Mecca and Eastern regions of the Kingdom of Saudi Arabia. The findings display a positive direct effect of TQM and Organizational culture on SMEs' performance, and a significant and positive indirect effect of TQM on SMEs' performance through OC. The study highlighted that TQM is a mechanism for improving their performance. This study therefore focused on TQM practices as a driver of operational resilience and the scope is Manufacturing SMEs in Nairobi.

Akinlua and Kakuri (2021) conducted a study on the mediating effect of supply chain integration on the relationship between total quality management practices and operational performance of manufacturing SMEs in South Africa. Data collection involved interviews with key personnel and a questionnaire survey. The study highlighted the importance of supply chain integration as a mediator between TQM practices and operational performance. Strong TQM practices fostered better communication and collaboration with suppliers, leading to improved performance during disruptions. This current study aimed to check whether these same TQM practices have the same effect in Nairobi based manufacturing SMEs.

Boussouar and Zitouni (2022) studied the role of total quality management practices in building operational resilience in Algerian manufacturing SMEs. This study explored manufacturing SMEs in Algeria. The research methodology involved a mixed-methods approach with interviews and a survey. This research emphasized the role of TQM practices (top management commitment, employee training) in building a culture of continuous improvement and proactive problem-solving. These aspects contribute to operational resilience by allowing firms to anticipate and adapt to disruptions more effectively. This study sought to find if a similar relationship between these TQM practices and operational resilience of manufacturing SMEs based in Nairobi exist.

Adomako and Danso (2019) conducted a study on Impact of Total Quality Management Practices on Operational Resilience of Manufacturing SMEs in Ghana. The study utilized a survey approach with questionnaires distributed to managers and employees. The study confirmed a positive relationship between TQM practices (employee involvement, continuous improvement, supplier partnerships) and operational resilience. Firms with strong TQM practices demonstrated better preparedness, responsiveness, and recovery from disruptions. This current study's aim was to conduct a study in manufacturing SMEs based in Nairobi and confirm if these same TQM practices have an effect on them.

Mohammed et al., (2019) conducted a study on the effects of Total Quality Management (TQM) on Ethiopian pharmaceutical manufacturing SMEs operational performance. Data

for this study was collected using self-administered questionnaires. The survey was carried out on 65 respondents drawn from 13 companies. The outcome of regression analysis indicated that customer focus, process management, product design and people management have significant contribution to at least 26 one of the operational performance measures. Top Management's support, suppliers' quality management and continuous improvement do not appear to contribute to higher levels of performance. This current study aimed to broaden the scope of the study to manufacturing SMEs in Nairobi, Kenya, including pharmaceutical manufacturing SMES inclusive. The study also aimed to check whether these TQM practices have an effect on their operational resilience.

Dhieu (2015) conducted a study on the adoption of TQM practices and performance of manufacturing firms in Nyeri County, Kenya. Questionnaires were used for data collection. Data analysis entailing descriptive statistics found out that continuous improvement had a positive influence on performance of manufacturing firms in Nyeri County, Employee training had a positive influence on performance, Top management commitment had a positive influence on performance and Customer focus positively influenced performance. This study focused on manufacturing SMEs in Nairobi, Kenya.

Table 2. 1: Summary of Literature and Research gap

Author	Findings	Research gaps	Focus on current gaps
Sutrisino, (2019)	The element of TQM influences the improvement of operational performance	This study investigated the relationship between TQM operational performance factors and their impact on the performance of SMEs. (Indonesia)	The study focused on TQM practices as a driver of operational performance, specifically manufacturing SMEs in Nairobi, Kenya

Boussouar and Zitouni (2022)	TQM practices contribute to the operational resilience of manufacturing SMEs	This study investigated the role of TQM practices in building operational resilience in Algerian manufacturing SMEs	This study focused on manufacturing firms in Nairobi Kenya
Mohammed et al., (2019)	Customer focus and operational performance have a strong relationship. Whereas top management support and supplier quality management do not appear to contribute to higher levels of performance	This study investigated the effect of a TQM system on the operational performance of pharmaceutical manufacturing firms (Ethiopia). One TQM practice was found to have an impact whereas two more were found to not be significant to performance.	The study aimed to broaden the scope of the study to manufacturing SMEs in Nairobi, Kenya, pharmaceutical manufacturing SMES inclusive, bridging a contextual gap. The study also aimed to check whether these TQM practices have an effect on operational resilience of Nairobi based manufacturing SMEs
Adomako and Danso (2019)	Employee involvement and supplier partnership contribute to operational resilience	This study focused on manufacturing SMEs in Ghana, as opposed to the current study which focused on manufacturing SMEs in Nairobi, Kenya	The study focused on manufacturing SMEs in Nairobi, Kenya. The study included other TQM practices in the study to broaden the context

Dhieu (2015)	Top management commitment, customer focus amongst other TQM practices: continuous improvement and employee training have a positive influence on performance	This study focused on manufacturing firms in Nyeri County, as opposed to the current study which has specific focus on manufacturing SMEs in Nairobi county.	The study focused on manufacturing SMEs in Nairobi, Kenya.

Researcher (2024)

2.4 Conceptual Framework

A conceptual framework is a set of overarching concepts and guiding ideas chosen from relevant fields of study that are used to arrange a subsequent presentation. The study sought to present the interaction between the various selected TQM practices and the operational resilience of manufacturing SMEs in Nairobi.

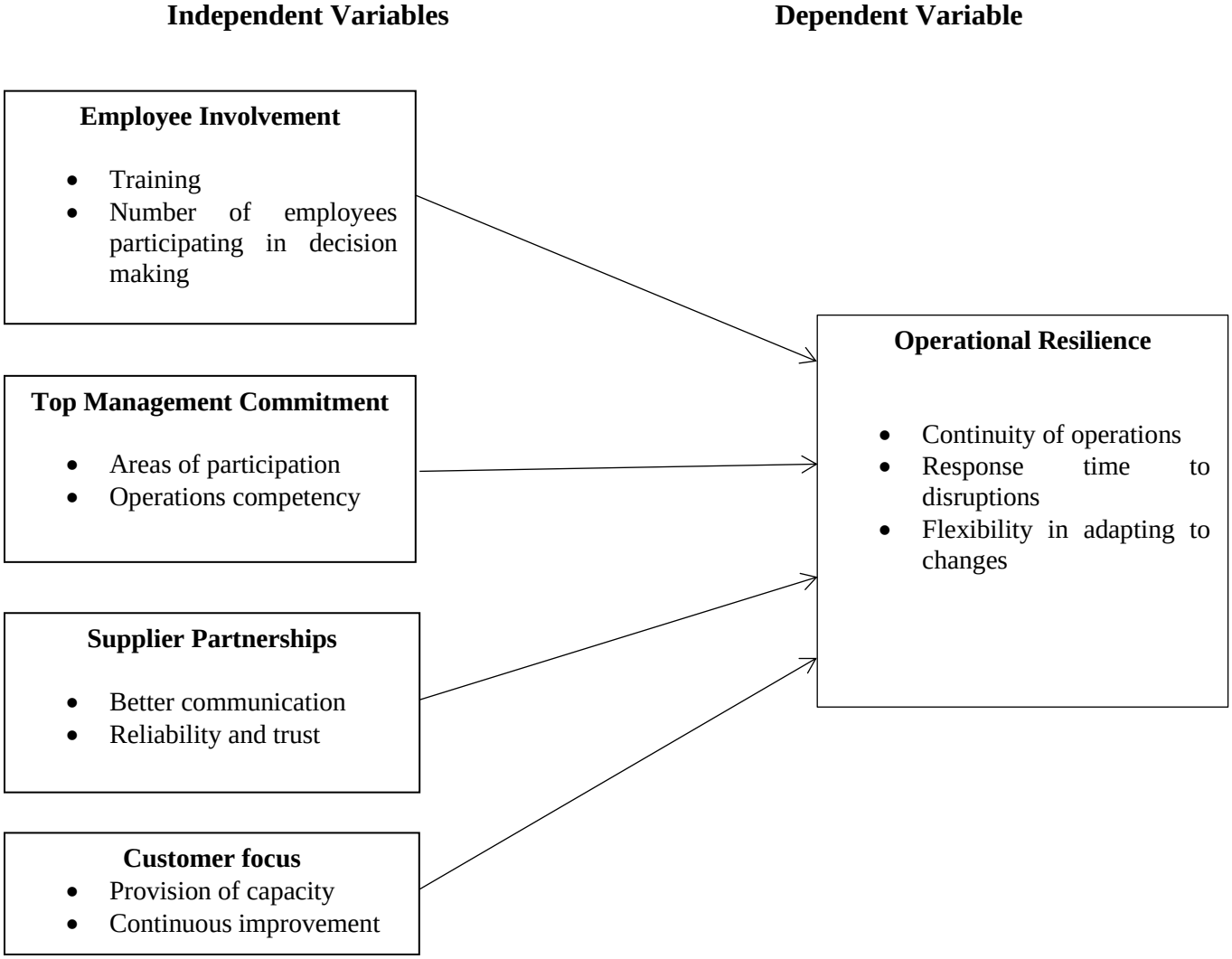

Figure 2. 1: Conceptual Framework

Source: Researcher (2024)

2.5 Operationalization of Variables

TQM was operationalized as employee involvement, top management commitment, supplier partnerships and customer focus, while operational resilience was operationalized as continuity of operations, response time to disruptions and flexibility in adapting to changes. Table 2.2 shows the values for each of the independent and dependent variables in the study.

Table 2. 2: Operationalization of variables

Variables	**Measures**	**Likert Scale**	**Authors**
Employee Involvement	• Training • Number of employees involved in decision making	5 point Likert scale	(Antony *et al*.,2017) (Wright *et al*.,2020)
Top management commitment	• Areas of participation • Operations competency	5 point Likert scale	(Yidliz *et al*.,2014) (Yilidrim.,2015)
Supplier Partnerships	• Better communication • Reliability and trust	5 point Likert scale	(Liu et al.,2021) (Handfield & Nichols,2019)
Customer focus	• Provision of capacity • Continuous improvement	5 point Likert scale	(Yoo & Kim,.2016) (Liao *et al*., 2020)
Operational resilience	• Continuity of operations • Response times to disruptions • Flexibility in adapting to changes	5 point Likert scale	(Essuman *et al*., 2020)

2.6 Chapter Summary

The theoretical frameworks literature review and the empirical literature are presented in this chapter. The resource-based view theory, which serves as the study's guiding theory, is covered in Section 2.1 along with the reasons behind its selection. The empirical literature on TQM and operational performance is examined in Section 2.2. More information regarding the research gap found during the critical literature review is

provided in Section 2.3. The conceptual framework of the investigation is presented in Section 2.4. The operationalization of the study's variables is given in Section 2.5. Finally, the chapter summary is given in section 2.6.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presented the methodological plan followed to conduct this investigation. The chapter discussed the philosophy, designs, population, and sample strategies. The chapter described the data collection tools, procedures, research quality, and data analysis and presentation methods.

3.2 Research Philosophy

The research paradigm provides a framework within which research is conducted (Antwi & Hamza, 2015). According to Tobi and Kampen (2018), the researchers' unique perspective on the link between knowledge and the method by which it is generated influences the philosophy that is used in a study. The investigation followed a positivist ideology. According to Hassan (2016), positivism is best suited for giving descriptive information about the social environment when experimental or quantitative approaches can be used to collect and evaluate data. Positivism emphasizes objective measurement and testing of research questions, and this research aimed to quantify the extent of TQM practices and measure their impact on operational resilience, which aligns with positivist principles. Quantitative data was collected through surveys and qualitative data was collected through interviews, allowing for statistical analysis to test the relationship between variables. Therefore, this strategy was suitable for the investigation at hand.

3.3 Research design

According to Tobi and Kampen (2018), a study research design includes procedures for addressing the research problem, including data collection, measurement, and analysis. The research problem defines the research design that will be adopted, and the research design assists the researcher in obtaining information relevant to the study problem. This can be used to test a theory, evaluate a program, or describe the processes involved in a phenomenon (Van Wyk, 2012).

A convergent mixed methods design was applied in this study. While quantitative studies establish a link between TQM practices and resilience, a deeper understanding of the mechanisms by which TQM fosters operational resilience in manufacturing SMEs was

required. A convergent mixed methods design involves collecting and analyzing both quantitative and qualitative data, but the primary purpose is to converge the findings from both methods to provide a more comprehensive understanding of the research questions (Creswell & Plano Clark, 2018). This approach allows the researcher to capture the breadth of TQM practices through a survey and gain in-depth insights from SME managers through interviews on how these practices contribute to operational resilience (Greene, 2007). Furthermore, exploring TQM within the specific context of Nairobi's manufacturing sector (Bryman, 2007) is crucial. Qualitative data from interviews help us understand specific opportunities or challenges related to TQM implementation that a survey might not capture.

Studying variety of SMEs allowed the researcher to explore the variations in TQM practices and operational resilience across different sectors and company sizes within Nairobi's manufacturing landscape. Also, the research provides a more comprehensive picture of how TQM practices influence operational resilience across the diverse landscape of Nairobi's manufacturing sector. The design also guides using quantitative and qualitative methodologies to address the research topic and emphasize the relationship between the study variables.

3.4 Target Population

The study's target population was manufacturing SMEs, obtained from the records of the Nairobi County licensing office, and the list was cross checked with KAM and MSMEA. The firms registered with this office were considered for this study. The study included managers from the manufacturing SMEs and the owners of the manufacturing SMEs. The population for the study was the 134 manufacturing SMEs in Nairobi with the managers or the SME owners from each of the firm targeted for giving information on how to use TQM practices has affected the operational resilience of the firms.

3.5 Sampling

A sampling procedure is a strategy or methodology for picking a portion of a population to participate in the research; it is the selection of a few individuals to fairly reflect the wider group from which they were drawn (Korstjens & Moser, 2018). In this investigation, the

sample frame was chosen from the 134 manufacturing SMEs that are registered and operational within Nairobi county. The investigation employed simple random sampling for quantitative data as the population in Nairobi is relatively homogenous, and each SME had an equal chance of being selected. Purposive sampling was employed for qualitative data, to select SMEs that were most frequent and more in numbers, to allow the researcher gather detailed data from individuals who can provide valuable insights into the topic of TQM and operational resilience. The researcher and the assistants reached out to manufacturing SMEs within their professional network and through online business directories in Nairobi. From the target population of 134 manufacturing SMEs, a total of 100 respondents were selected. Taro Yamane's (1973) sample size formula which was updated by Singh & Masuku (2014) was used to establish the study's sample size. This was considered satisfactory for the quantitative part of the convergent mixed methods design.

$$n = \frac{N}{1 + N_{e^2}}$$

Where:

n= Desired Sample Size

N= Population

e = Margin of Error at 5% (standard value of 0.05)

The size of the sample in this research will be:

$n = \frac{134}{1+134(0.05)^2}$= 100

3.6 Data collection

Data collection is a systematic means of obtaining and measuring information on variables of interest to answer research questions, test hypotheses, and evaluate outcomes (Burns & Groove, 2014). In this study, a quantitative self-administered questionnaire was used to collect data. A questionnaire is a type of research instrument that consists of a series of questions or other types of prompts designed to obtain information from a respondent (Creswell & Creswell, 2017). The study questionnaire was designed based on the study literature and the operationalization of the variables. The questionnaire utilized a 5-point Likert scale, with statements divided into five main sections based on the research variables. An interview guide was developed based on the research questions and existing literature on TQM and operational resilience (Flick, 2014). The guide included open-ended

questions to encourage participants to share their experiences and perspectives freely (Denzin & Lincoln, 2018). This was administered to cover the qualitative aspect. The schedule was in line with the questionnaires, to gain deeper insights into the phenomenon. All interviews were conducted in a private and comfortable setting convenient for the participants. Informed consent was obtained before each interview, and participants were assured of anonymity and confidentiality (Punch, 2020). The interviews, that were thirty minutes long were audio-recorded with permission from the participants and transcribed for further analysis.

3.7 Data Collection Procedures

The data collection methods employ the same systematic methodology as when conducting a research survey (Burns and Groove, 2014). The research team visited the identified firms. This approach ensured the relevant decision-makers were reached within each SME. The managers and SME owners were met, the research project was explained to them in detail, and their informed consent to participate was obtained. They were then offered a paper-based questionnaire for them to fill out on the spot and others were left for picking up later, with assistance offered if needed. A cover letter outlining the study's objectives and assuring strict anonymity was attached to the questionnaire. For the interview portion of the study, the participating SMEs were visited. Semi-structured interviews with the managers or SME owners who had consented to participate were scheduled. The interviews took place in designated conference rooms or private offices within the SMEs' premises to ensure a quiet and distraction-free environment. A total of five individuals participated in the interviews. These individuals were managers conversant with operations management or the manufacturing SME owners within the participating SMEs. A standardized interview approach was employed where all participants received the same set of questions in a consistent order. Prior to the interviews, all research team members underwent training to ensure consistency in questioning techniques, probing strategies, and data collection practices.

3.8 Research Quality

To improve the accuracy of study results, reliability and validity are essential components of evaluating the quality of a research instrument. The study concentrated on the two factors listed below.

3.8.1 Validity

A validity test was conducted to see whether the research study measures what it is intended to assess and to confirm the accuracy of the results. This study evaluated the two types of validity—conceptual and content—that have been generally acknowledged in the literature (Heale & Twycross, 2015; Bull *et al.,* 2019). Heale & Twycross (2015) explain that construct validity measures whether the study can draw meaningful conclusions from the test results whereas content validity evaluates how well the research instrument covers the variable contents.

To rule out any widespread biases, misunderstandings, and other mistakes that could occur throughout the data gathering process, the instrument underwent a pilot test. Variables that were found invalid were reviewed and framed differently in a manner that was relevant to the respondents in relation to the study objective

3.8.2 Reliability

According to Mohajan (2017), Reliability is the extent to which the research tool remains consistent over time given a comparable sample. When used correctly, an instrument should consistently and accurately produce the same results under the same conditions and at various times. Stable and consistent outcomes are expected if the instrument is reliable. Globally, Cronbach Alpha test has been adopted by authors as a key test for reliability (Gliem & Gliem 2013; Taber, 2018; Ram, 2020). This study adopted the interpretation by Cooper and Schindler (2010) that a co-efficient of at least 0.70 is reliable for the study which is also in line with the suggestions by Ravinder & Saraswathi, (2020). According to DiMattio *et al.,* (2017)'s advice, pilot research that is a subset of the primary study will be carried out with a sample size of 5–10 participants to verify the validity of the survey instrument.

Table 3. 1: : Alpha-Cronbach's Decision Rule

Cronbach's Alpha	Internal Consistency
$\alpha \geq .9$	Excellent
$.9 > \alpha \geq .8$	Good
$.8 > \alpha \geq .7$	Acceptable
$.7 > \alpha \geq .6$	Questionable
$.6 > \alpha \geq .5$	Poor
$.5 > \alpha$	Unacceptable

Source; (Gliem, 2003)

3.9 Data analysis

Data analysis is the process of inspecting, cleaning, transforming, and modeling data to uncover meaningful insights, patterns, and trends. It involves a systematic approach to examining data sets to extract valuable information that can inform decision-making, problem-solving, and hypothesis testing. The data was cleaned by identifying and correcting errors, inconsistencies, or missing values in the data set. Data was processed for analysis by transforming, scaling, or encoding variables. It involved removing duplicate records, correcting typos, filling in missing values through imputation, and standardizing data formats. It also included standardizing numeric variables, encoding categorical variables, and normalizing data to improve model performance.

The most recent SPSS V27, released in 2020, was used to analyze the data gathered. This tool is applicable to this study due to its advanced features that allows for easy coding of quantitative data in nature and assigning of values for further meaningful analysis. The researcher analyzed the data by employing descriptive and inferential statistics. Descriptive statistics was used to examine the first objective, to determine the TQM practice implementation levels. It entails summarizing characteristics of the data set, such as central tendency (mean, standard deviations and variance), and distribution. Inferential analysis

was used to draw conclusions and makes predictions about a population based on sample data, using techniques such as hypothesis testing and regression analysis. The effect of TQM on operational resilience was analyzed using t-test and ANOVA test.

3.10 Unit of Analysis

The study focused on how well the manufacturing firm can maintain its critical operations in the face of disruptions, such as supply chain interruptions, equipment failures, or natural disasters. When studying resilience, the study used a combination of quantitative and qualitative methods, including surveys and interviews.

By focusing on the individual manufacturing firm as the unit of analysis, researcher gained insights into specific strategies, practices, and characteristics that contribute to or hinder resilience in the manufacturing sector. Thus the individual manufacturing firm was the primary unit of study

3.11 Ethical Considerations

The information gathered was only used by the researcher for this study's purpose; it was not disclosed to any other party. Information from the respondents was handled with the utmost confidentiality, with no information about the respondents' identities disclosed. An open mind was maintained, and opinions were conveyed as provided. The researcher did not make any changes and expressed great gratitude for all the material that provided support for this investigation. Participants in this research remained anonymous, and this was guaranteed.

Any communications pertaining to this research was honest and forthright. The researcher steered clear of any misinformation of any kind, as well as the biased representation of main data findings. Before the collection of data, a letter of authorization was obtained to proceed with the study from the postgraduate department at Strathmore University and an introduction letter was acquired from the Ministry of Education. The permission to carry out the study was sought from the National Commission for Science, Technology, and Innovation (NACOSTI) to conduct research in Nairobi’s manufacturing SMEs.

3.12 Chapter Summary

The primary subject of this chapter is detailing the approach used in this investigation. The chapter gives a general review of the population, design, and sampling methodologies, the data collection techniques, study standards, and the strategy taken for the analysis of data and presentation, to answer the research questions in chapter one.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter discusses the analysis of data according to the study's goals. It delves into the thorough process of cleaning data, coding, detecting and eliminating outliers, and assessing the reliability of the research instrument. Descriptive statistics, including measures like mean, standard deviation, minimum, and maximum, are illustrated through frequency distributions. Additionally, correlation analysis, t-tests, and ANOVA are also included in this section.

4. 2 Response Rate

The number of surveys that received a complete response divided by the total number of participants who met the eligibility requirements for the sample yielded the response rate. According to Hair et al. (2010), response rates are important in research since they ensure that the questionnaires used in the studies are valid for analysis.

After the questionnaires were returned from the field, the researcher cross-checked them to make sure they were accurate and complete. A total of 100 questionnaires were used and 93 were completely filled and returned. The response rate was high at 93 percent. This high response rate stemmed from employing proficient enumerators who engaged in face-to-face interactions with respondents. This direct interaction between enumerators and participants enhanced the clarity of questions, thereby diminishing restricted response bias and bolstering confidence in the data, ultimately leading to the high response rate. This met the 67 percent acceptable response rate criterion needed for surveys to be further analyzed (Ndinda, 2019). The remaining 7 questionnaires had a significant portion of unanswered questions and had inconsistency in responses and thus left from analysis to maintain data integrity and reliability and to prevent distortion of results.

Table 4. 1: Response Rate

Questionnaires	Response	Percent
Correctly filled and returned	93	93.00
Incorrect Correctly filled	7	7.00
Total Issued	100	

Source: Survey Data, 2024

4. 3 Data Processing

Data processing entailed data cleaning, coding checking and removal of outliers. After obtaining the questionnaires from the field, the researcher numbered them to ensure that every questionnaire was recorded and ready to undergo further screening.

Prior to data analysis, the researcher cleaned the data. This was achieved by identifying outliers. Outliers are a tiny fraction of observations that show patterns different from those of the majority of the observations in the data set (Taha, & Hadi, 2019). These figures are notable for being atypically greater or lesser than most data readings. Several techniques were employed in this study to check for outliers. First, the minimum and maximum values were utilized to do a frequency analysis. The data were cross-checked to look for any extremely high or low numbers outside of the Likert scale values that might have been entered erroneously. According to (Donovan & Sanders, 2005), data coding is the process of organizing gathered data into categories so that it can be examined to extract useful information.

The process of data coding involved allocating numerical values to the scale. 1-strongly disagree, 2-disagree, 3- undecided, 4- agree and 5-strongly agree to each of the constructs data using excel sheet. After that, it was exported to SPSS for examination. Boxplots provided a boxplot that was used to examine for outliers (see appendix V). There were no noticeable anomalies found. Table 4.2 provides that identification for missing values. The list-wise exclusion method was used to accomplish this. There were no missing values in the table.

Table 4. 2: Identification for Missing Values

Case Processing Summary						
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Operational resilience	93	100.0%	0	0.0%	93	100.0%
Employee involvement	93	100.0%	0	0.0%	93	100.0%
Top management commitment	93	100.0%	0	0.0%	93	100.0%
Supplier partnership	93	100.0%	0	0.0%	93	100.0%
Customer focus	93	100.0%	0	0.0%	93	100.0%

Source: Survey Data, 2024

4.4 Reliability Analysis

Reliability testing was done before data processing to confirm the validity of the study instrument that was used. After assessment, the reliability index is presented in Table 4.3. This was carried out by estimating Cronbach's alpha value. Operational resilience reliability value of 0.927, employee involvement 0.882, top management commitment 0.814. Supplier partnership and customer focus variables had 0.768 and 0.837 reliability values respectively. A cut-off alpha coefficient of 0.7 is sufficient, according to Ursachi, Horodnic, and Zait (2015), to demonstrate the consistency and reliability of the item scales. With Cronbach alpha values above 0.7, all of the constructs used were remarkably reliable, as recommended by Lee Cronbach (1951) and Roller (2020).

Table 4. 3: Reliability by Cronbach Alpha Test Results

Variable	Cronbach alpha	Internal Consistency (as per Gliem, 2003)
Operational resilience	.927	Excellent
Employee involvement	.882	Good
Top management commitment	.814	Good
Supplier partnership	.768	Acceptable
Customer focus	.837	Good

Source: Survey Data, 2024

4.5 Univariate Descriptive Statistics

This entails the study's demographic statistics as well as a description of the variables under investigation.

4.5.1 Demographic Descriptive Statistics

This section includes descriptive data that provide details about the respondents' gender, age, and number of years in the organization, number of employees and the nature of the business. This illustrates the organizational characteristics. Table 4.4 shows the age distribution and indicate majority were male which accounted for 57.0 percent (n = 53) compared to females at 43 percent. Further, the respondents aged below 35 years constituted 33.3 percent. The majority of the manufacturing SMEs owners ages between 36-50 years. One reason why the majority of manufacturing SMEs owners are aged between 36-50 years could be their accumulation of experience and expertise in the industry. Typically, individuals in this age range have had sufficient time to gain hands-on experience, develop industry networks, and acquire the necessary skills and knowledge to successfully establish and manage a manufacturing business. Additionally, they may have reached a point in their careers where they are financially stable and have the confidence and resources to take on the challenges of entrepreneurship. In addition, the participants were required to specify the period of their employment in the manufacturing industry. From the results in Table 4.4, it is clearly indicated that the experience distribution is fair but those with experience more than 10 years constituted over 40 percent.

Majority of manufacturing SMEs have employees less than 20 (34.4 percent) while those with 20-50 employees constituted 26.9 percent. Those with 50 and above employees were below 40 percent of the total participant in this study. The distribution of manufacturing SMEs by the number of employees can be attributed to several factors. Firstly, smaller SMEs with fewer than 20 employees may dominate due to the prevalence of startups and micro-enterprises in the manufacturing sector. These smaller businesses often emerge as individual entrepreneurs or small teams venture into the market with limited resources, focusing on niche markets or specialized products.

The percentage decline in the number of SMEs as the number of employee's increases, particularly beyond the 20-50 employee range, could be a result of various challenges that businesses encounter as they grow. These challenges may include increased operational complexities, higher overhead costs, stricter regulatory requirements, and difficulties in accessing financing and resources. As a result, some SMEs may choose to maintain a leaner organizational structure to remain agile and competitive in the market rather than expanding their workforce significantly.

Furthermore, the concentration of manufacturing SMEs with fewer than 20 employees may also reflect the nature of the manufacturing industry itself. Many manufacturing processes have become increasingly automated and technologically advanced, allowing smaller teams to achieve higher levels of productivity. Additionally, outsourcing certain tasks or relying on subcontractors for specialized services can enable SMEs to maintain smaller internal teams while still meeting production demands.

Most of the manufacturing SMEs studied fall under Pharmaceuticals, food and beverages at 11.8 percent each. This is followed by those in textile and apparels at 9.7 percent. Chemical and allied, leather and footwear and those in plastic and rubber at 8.6 percent each. The least studied was in timber wood and furniture at 4.3 percent of the total. Manufacturing SMEs in Kenya play a vital role in fostering human capital, creativity, and innovation essential for manufacturing competitiveness. Despite contributing 14% to the

GDP and employing 30% of the workforce, these SMEs face challenges in operations management hindering their growth and competitiveness. As a result, they struggle to maintain competitiveness both locally and globally (Mkala, Wanjau, & Kyalo, 2018).

Table 4. 4: Demographic Descriptive Statistics

		Frequency	Percent	Cumulative Percent
Gender	Male	53	57.0	57.0
	Female	40	43.0	100.0
	Total	93	100.0	
Age	Below 35 years	31	33.3	33.3
	36-50 years	45	48.4	81.7
	Over 51 years	17	18.3	100.0
	Total	93	100.0	
Number of years in the organization	Below 5 years	29	31.2	31.2
	5-10 years	19	20.4	51.6
	11-19 years	22	23.7	75.3
	Over 20 years	23	24.7	100.0
	Total	93	100.0	
Number of employees in the organization	Less than 20	32	34.4	34.4
	20-50	25	26.9	61.3
	51-100	12	12.9	74.2
	Above 100	24	25.8	100.0
	Total	93	100.0	
Nature of SME business	Building and construction	7	7.5	7.5
	Chemical and allied	8	8.6	16.1
	Energy and electrical	5	5.4	21.5
	Agriculture	5	5.4	26.9

Leather and footwear	8	8.6	35.5
Metal and allied	6	6.5	41.9
Pharmaceuticals	11	11.8	53.8
Textiles and apparels	9	9.7	63.4
Paper and board	5	5.4	68.8
Automotive	6	6.5	75.3
Food and Beverages	11	11.8	87.1
Plastics and rubber	8	8.6	95.7
Timber wood and furniture	4	4.3	100.0
Total	93	100.0	

Source: Survey Data, 2024

4.5.2 Descriptive Statistics of Study Variables

Descriptive statistics for every variable were examined in this section. The operational resilience, total quality management practices (Employee involvement, Top management commitment, Supplier partnership and Customer focus) were the variables studied. The central measures of tendency that described each item were its mean scores, standard deviation, skewness, and kurtosis. The analysis was done using descriptive statistics; mean and standard deviation with a Likert scale of 1-5, the scores of which a weak association was taken to represent a variable which had a mean score of 0 to 2.5 on the continuous Likert scale. On the other hand, scores of 2.5 to 3.5 represented moderate significance and mean scores of 3.5 to 4.8 on the continuous Likert was taken to have a great and strong influence.

4.5.3 Descriptive statistics for Operational Resilience

Table 4.5 describes operational resilience based on the responses from the participants. The table provides description of central measures of tendency including mean, standard deviation and the frequency of responses on each item. The mean and standard deviation are fundamental measures in descriptive statistics that provide valuable insights into the characteristics of a dataset. The mean represents the central tendency of the data, giving an average value around which the observations are distributed.

As shown in Table 4.5 the study established that 39.8 % strongly agreed, 39.8% agreed, 12.9% were undecided while 4.3% of the respondents disagreed and 3.2% strongly disagreed that the organization maintains continuity of operations well during disruptions or crises. The mean of 4.09 and standard deviation of 0.996 clearly showed that there was high response in agreement concerning the statement on operational resilience among manufacturing SMEs in Nairobi. On the second construct/ item, majority were in agreement that 'the organization's response time to unexpected disruptions is fast'. This is supported by high frequency of 21.5% and 31.2 who strongly agreed concerning the sentiment. Finally, they agreed that the organization had the ability to be flexible in adapting to changes in the business environment.

Table 4. 5: Descriptive Statistics of Operational Resilience

Statement		**SA**	**A**	**U**	**D**	**SDA**	**Mean**	**Std. Dev**
The organization maintains continuity of operations well during disruptions or crises	**F**	37	37	12	4	3	**4.09**	**0.996**
	%	*39.8*	*39.8*	*12.9*	*4.3*	*3.2*		
The organization's response time to unexpected disruptions is fast	**F**	20	29	26	12	6	**3.48**	**1.157**
	%	*21.5*	*31.2*	*28.0*	*12.9*	*6.5*		
The organization has the ability to be flexible in adapting to changes in the business environment	**F**	34	44	12	1	2	**4.15**	**0.846**
	%	*36.6*	*47.3*	*12.9*	*1.1*	*2.2*		

Source: Survey Data, 2024

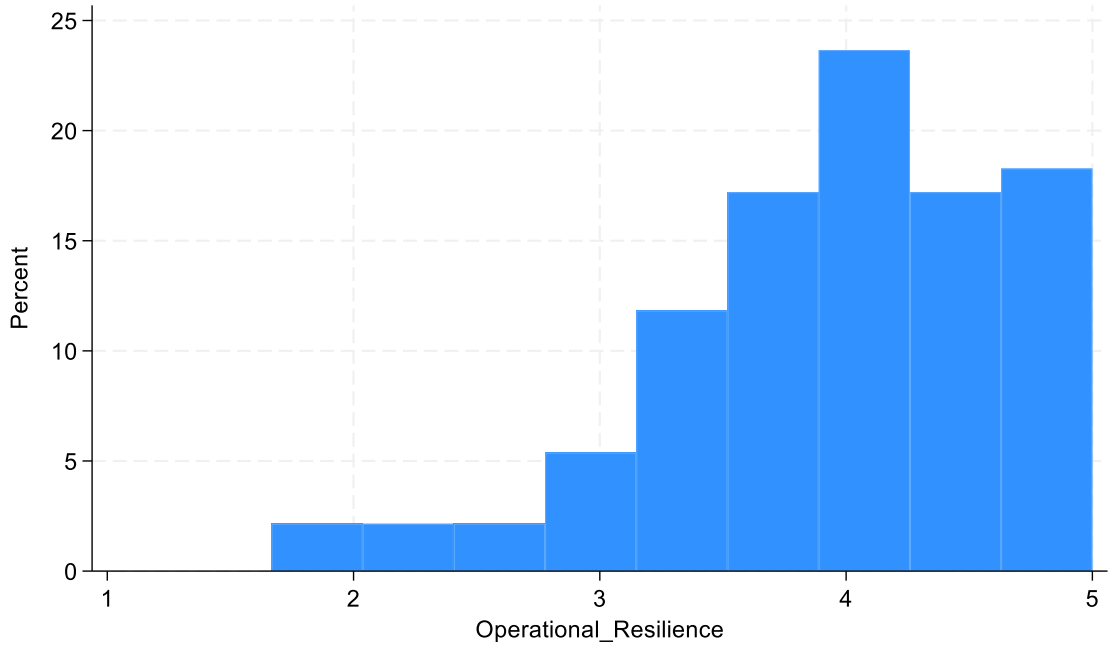

Figure 4. 1: Frequency Distribution for the Responses on the Operational Resilience

From the analysis their means responses were approximate 4 which according to the Likert scale 4 is agree and their standard deviations were small (see Figure 4.1). Statistically the mean provides a single, representative value that summarizes the dataset and helps in understanding its central value. The standard deviation measures the dispersion or spread of the data points around the mean. It quantifies the degree of variability or dispersion within the dataset based on the responses. A small standard deviation indicates that the responses were close to the mean, while a large standard deviation indicates that the responses were more spread out. Therefore, the standard deviation provides information about the consistency or variability of the data. Together, the mean and standard deviation offer complementary information about the distribution and characteristics of a dataset. They help in understanding the typical value of the data (mean) and how much individual values deviate from this typical value (standard deviation).

4.5.4 Descriptive Statistics for Total Quality Management Practices

Table 4.6 presents descriptive for the TQM practices. It entails the mean, standard deviation and frequencies of the response. As discussed earlier, the statistics explains how the sampled participant gave out their opinions regarding the TQMs. There are four components of TQMs; the employee involvement, top management commitment, supplier

partnership and customer focus. Each had two items measured on 5-Likert scale. On average, most of the respondents were in agreement that the organization often involves employees to participate in training sessions related to handling disruptions and improving operational resilience. They also agreed that the SMEs involve employees in decision-making processes related to operational resilience.

Further, the table indicates majority of the responses were approximate 4(agree from the Likert scale). Their standard deviations were small implied closer responses from one participant to the other. Concerning the top management commitment, they were in agreement that the top management actively participates in managerial activities to enhance operational resilience and also the top management actively participates in managerial activities to enhance operational resilience.

Table 4. 6: Descriptive Statistics for Total Quality Management Practices

Statement		**SA**	**A**	**U**	**D**	**SDA**	**Mean**	**Std. Dev**
Employee involvement								
The organization often involves employees to participate in training sessions related to handling disruptions and improving operational resilience	**F**	25	29	28	7	4	**3.69**	**1.083**
	%	*26.9*	*31.2*	*30.1*	*7.5*	*4.3*		
The organization involves employees in decision-making processes related to operational resilience	**F**	21	40	22	7	3	**3.74**	**0.999**
	%	*22.6*	*43.0*	*23.7*	*7.5*	*3.2*		
Top management commitment								
The top management actively participates in managerial activities to enhance operational resilience	**F**	29	39	14	7	4	**3.88**	**1.072**
	%	*31.2*	*41.9*	*15.1*	*7.5*	*4.3*		
The top management actively participates in managerial activities to enhance operational resilience	**F**	31	34	23	3	2	**3.96**	**0.955**
	%	*33.3*	*36.6*	*24.7*	*3.2*	*2.2*		

Supplier partnership								
The communication channels between the organization and its suppliers during disruptions are satisfactory	**F**	30	34	19	5	5	**3.85**	**1.103**
	%	*32.3*	*36.6*	*20.4*	*5.4*	*5.5*		
The organization's key suppliers are reliable and trustworthy to support during challenging periods	**F**	20	40	26	3	4	**3.74**	**0.977**
	%	*21.5*	*43.0*	*28.0*	*3.2*	*4.3*		
Customer focus								
The organization provides sufficient capacity to meet customer demands during disruptions	**F**	31	33	19	5	3	**3.92**	**1.024**
	%	*33.3*	*37.6*	*20.4*	*5.4*	*3.2*		
The organization frequently seeks feedback from customers to enhance operational processes	**F**	25	43	16	6	3	**3.87**	**0.992**
	%	*26.9*	*46.2*	*17.2*	*6.5*	*3.2*		

Source: Survey Data, 2024

On supplier partnership, each manufacturing SMEs opined that the communication channels between the organization and its suppliers during disruptions are satisfactory. Further, the organization's key suppliers are reliable and trustworthy to support during challenging periods. Finally, regarding the customer focus, the agreed that the organization provides sufficient capacity to meet customer demands during disruptions and the organization frequently seeks feedback from customers to enhance operational processes. From the findings, TQM promotes a culture of employee involvement and empowerment. Engaged employees are more likely to contribute ideas for process improvement and problem-solving. This increased involvement fosters a resilient workforce that can adapt quickly to changing circumstances and contribute to the company's overall resilience.

TQM emphasizes building strong relationships with suppliers based on trust, collaboration, and mutual benefit. By working closely with reliable suppliers, manufacturing SMEs can better manage supply chain disruptions and minimize the impact of external shocks on their operations. TQM encourages a culture of continuous learning and adaptation. Manufacturing SMEs that embrace TQM principles are more likely to monitor market

trends, technological advancements, and best practices in their industry. This ongoing learning enables them to anticipate changes and adapt their operations accordingly, enhancing their resilience in the face of uncertainty.

TQM emphasizes meeting or exceeding customer expectations. By closely monitoring customer feedback and preferences, Manufacturing SMEs can tailor their products or services to meet evolving market demands. This customer-centric approach enhances the company's ability to withstand market disruptions and maintain competitiveness. By embracing TQM practices, SMEs can build robust and agile operations capable of withstanding challenges and thriving in dynamic environments.

4.6 Correlation Analysis

Table 4.7 presents the Pearson correlation coefficients for bivariate relationships. The investigation revealed a significant and positive relationship between operational resilience (OR) and employee involvement (EI) with Pearson coefficient of $\rho = 0.500$ ($p = 0.000$). The significance indicates employee involvement plays a crucial role in enhancing operational resilience among manufacturing SMEs.

Table 4. 7: Correlation Analysis

		OR	EI	TMC	SP	CF
OR	Pearson Correlation	1	.500**	.403**	.514**	.428**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	93	93	93	93	93
EI	Pearson Correlation	.500**	1	.499**	.463**	.522**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	93	93	93	93	93
TMC	Pearson Correlation	.403**	.499**	1	.590**	.498**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	93	93	93	93	93
SP	Pearson Correlation	.514**	.463**	.590**	1	.563**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	93	93	93	93	93

CF	Pearson Correlation	.428**	.522**	.498**	.563**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	93	93	93	93	93

**. Correlation is significant at the 0.01 level (2-tailed).

KEY: OR-Operational Resilience, EI- Employee Involvement, TMC- Top Management Commitment, SP-Supplier Partnership and CF- Customer Focus

Source: Survey Data, 2024

Employees are often the ones closest to the day-to-day operations of the business. Their involvement allows them to share valuable insights, identify potential risks, and contribute to problem-solving efforts. This collective intelligence can help SMEs anticipate and respond effectively to disruptions, enhancing their resilience. Involving employees in decision-making processes and problem-solving activities can boost morale and job satisfaction. When employees feel valued and empowered, they are more likely to remain loyal to the company, reducing turnover rates and ensuring continuity of skills and knowledge within the organization.

Further the association between top management commitment ($\rho = 0.403, p = 0.000$), supplier partnership ($\rho = 0.514, p = 0.000$), customer focus ($\rho = 0.428, p = 0.000$), and operational resilience were positive and significant. This implies these variables and operational resilience are all interlinked and play crucial roles in the success and sustainability of manufacturing SMEs. When top management is committed to fostering a culture of excellence and resilience within the organization, it sets the tone for the entire workforce. Their commitment ensures that resources are allocated, policies are established, and initiatives are implemented to prioritize resilience-building efforts. This commitment trickles down throughout the organization, motivating employees to actively contribute to resilience-enhancing activities.

Establishing strong partnerships with suppliers is essential for manufacturing SMEs to ensure a reliable and efficient supply chain. By collaborating closely with suppliers, SMEs can streamline logistics, reduce lead times, and improve the quality of raw materials or

components. These partnerships also facilitate knowledge sharing and risk management strategies, enabling SMEs to respond effectively to supply chain disruptions and maintain continuity of operations. Manufacturing SMEs that prioritize customer satisfaction and actively seek to understand and meet customer needs are better positioned to achieve long-term success. By maintaining open lines of communication with customers, SMEs can anticipate market trends, identify emerging demands, and tailor their products or services accordingly. This customer-centric approach not only enhances competitiveness but also fosters loyalty and resilience by ensuring a stable customer base even during economic downturns.

4.7 Results for Independence T-Test

Table 4.8 provides independence t test for means. The mean difference provides a significant independence between the variables with respect to responses given. The test provides a systematic way to assess whether the mean of a sample differs significantly from a specified value, helping researcher draw conclusions about the manufacturing SMEs from which the sample was drawn. The p-values for the two tailed are significant at 5 percent. This implies the samples were independent across all the variables. The significance value (p-value) represents the probability of obtaining the observed results.

Table 4. 8: One Sample Test

One-Sample Test						
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Operational Resilience	54.986	92	0.000	3.907	3.77	4.05
Employee Involvement	40.303	92	0.000	3.715	3.53	3.90
Top M. Commitment	41.821	92	0.000	3.919	3.73	4.11
Supplier Partnership	42.540	92	0.000	3.796	3.62	3.97
Customer Focus	45.504	92	0.000	3.898	3.73	4.07

Source: Survey Data, 2024

A significance level of 0.000 indicates that the probability of observing such extreme differences between sample means is very low (less than 0.05). Therefore, these results suggest that across all studied variables, the sample means significantly differ from the null hypothesis means. In practical terms, this means that Operational Resilience, Employee Involvement, Top Management Commitment, Supplier Partnership, and Customer Focus are all significantly higher than the hypothetical average value (mean = 0). These statistically significant results of the independent t-test add credibility and support the findings. It is in order to confidently claim that the manufacturing SMEs surveyed exhibit strong operational resilience, employee involvement, top management commitment, supplier partnerships and customer focus. This information could be valuable for organizations to understand their strengths and areas for improvement in these specific domains.

4.8 Analysis of Variation (ANOVA Results)

Table 4.9 presents analysis of variation for all independent variables across all levels of operational resilience. The importance this ANOVA allows for the assessment of interaction effects between employee involvement, top management commitment, supplier partnership, and customer focus. Interaction effects occur when the effect of one independent variable on the dependent variable depends on the level of another independent variable.

Table 4. 9: Analysis of Variance

ANOVA

Operational Resilience		Sum of Squares	df	Mean Square	F	Sig.
Employee Involvement	Between Groups	28.692	10	2.869	5.346	.000
	Within Groups	44.007	82	.537		
	Total	72.699	92			
Top management commitment	Between Groups	27.769	10	2.777	4.806	.000
	Within Groups	47.376	82	.578		
	Total	75.145	92			
Supplier partnership	Between Groups	30.468	10	3.047	6.636	.000

	Within Groups	37.651	82	.459		
	Total	68.118	92			
Customer focus	Between Groups	23.634	10	2.363	4.951	.000
	Within Groups	39.145	82	.477		
	Total	62.780	92			

Source: Survey Data, 2024

Understanding interaction effects provides deeper insights into the relationships between TQMs and operational resilience. The ANOVA uncovers complex relationships between variables by examining how group means vary in response to different levels of independent variables. This exploration can lead to a better understanding of the factors influencing the operational resilience for the manufacturing SMEs in Nairobi, Kenya. For each independent variable (employee involvement, top management commitment, supplier partnership, and customer focus), the results show that there are statistically significant differences across the levels of operational resilience among the manufacturing SMEs.

This conclusion is supported by the very low p-values (all reported as 0.000), indicating that the observed differences in operational resilience between groups are unlikely to have occurred by random chance alone. The F-statistic values are relatively high (ranging from 4.806 to 6.636), further indicating substantial differences between group means compared to the variability within groups. These results suggest that employee involvement, top management commitment, supplier partnership, and customer focus significantly influence operational resilience. They all influence operational resilience. The ANOVA tests provide evidence that the differences in operational resilience observed across the groups defined by each independent variable are not merely due to random variability but are likely attributable to the specific factors associated with each manufacturing SMEs in Nairobi, Kenya.

4.9 Analysis of Interviews

The study interviewed some of the manufacturing firms to get rich, detailed data to understand insights into firms' thoughts, experiences, perspectives, and behaviors. This is because interviews are particularly valuable for exploring topics that require deep understanding. The response rate of the interviews was 100 percent as all the five

interviews that were scheduled successfully took place. Through analysis, the study unravels complexities in respondents' narratives, leading to a deeper understanding of the factors influencing operational resilience. From the five interviews conducted, the study analyzed interviews by first coding all the responses from interviewee. The mode of coding was inductive coding, and the method of analysis was thematic analysis. This coding commences with identifying main themes and concepts that emerge while reviewing the data. This approach, also known as open coding, as described by Palys & Atchison (2014), involves multiple restatements as the researcher analyzes the data. As the voice transcripts are reviewed, commonalities among the categories or themes were noted down (Saylor Academy, 2012).

Table 4.10 provides a summary of responses from the interviews on how the firms maintained operational resilience. Five manufacturing SMEs took part in the interviews. Interviewees gave their opinions how resilient they were when struck by disruptions. From the findings, most of them indicate that the SMEs in pharmaceuticals maintained their operational resilience through maintaining continuity through proactive measures, rapid response with dedicated team, and flexibility through cross-training and adaptable production. The operation manager noted that ‘We have established relationships with multiple suppliers for critical raw materials. Additionally, we maintain a safety stock of essential ingredients to mitigate potential shortages. For instance, during a recent global shortage of a key pharmaceutical ingredient, our safety stock allowed us to continue production for several weeks while we secured alternative suppliers’.

In food and beverages, they maintain continuity during disruptions by diversified sourcing, safety stock, preventative maintenance. They also respond to time disruptions and flexibility in a changing environment. The quality assurance manager noted that ‘We maintain contracts with multiple suppliers for each key ingredient, mitigating the risk of disruptions from a single source. For example, we source honey from various regions in Kenya to avoid dependence on a single harvest’. ‘We hold safety stock for critical ingredients like flour and rice to buffer against short-term shortages. This allows us to continue production while seeking alternative suppliers if necessary’. The study also found

that firms in Leather & Footwear were resilient by embracing flexibility in the business environment production adjustments, multi-channel sales and skilled workforce. By analyzing these interviews, the study confirms accuracy, relevance, and representativeness of their perspectives, enhancing the credibility and trustworthiness of the study.

Table 4. 10: Interview Analysis for Enhancing Operational Resilience

Operational Resilience of Manufacturing SMEs			
Interviewee	**Sector**	**Key Theme**	**Sub theme**
Operations Director at Pharma Ltd	Pharmaceuticals	Maintaining Continuity Through Proactive Measures.	Diversified Suppliers & Safety Stock
		Rapid Response with Dedicated Team	
		Flexibility Through Cross-Training and Adaptable Production	Cross-Trained Workforce, Adaptable Production Lines
Quality Assurance Manager at Winnie's pure health.	Food and Beverages	Maintaining Continuity During Disruptions	Diversified Sourcing, Safety Stock, Preventative Maintenance
		Response Time to Disruptions	Minor Issues (e.g., equipment malfunction, Moderate Issues (e.g., temporary supplier shortage) and Major Disruptions (e.g., natural disaster)

		Flexibility in a Changing Environment	Product Mix Adjustments, Packaging Options and Seasonal Offerings
Co-founder and Design Director at Kawa Garments Limited	Textiles & Apparel	Maintaining Continuity During Disruptions	Diversified Suppliers, Safety Stock and Cross-Trained Workforce
		Response Time to Disruptions	Fast Response, Slower Response and Reasoning
		Flexibility in a Changing Environment	Adapting to New Trends, Customizable Orders and Scalable Production
Adix shoes limited	Leather & Footwear	Maintaining Continuity During Disruptions	Effectiveness
		Response Time to Disruptions	Our response time varies and reasoning
		Flexibility in the Business Environment	Production Adjustments, Multi-Channel Sales and Skilled Workforce
Head of Production at Zami Chemicals Limited	Chemicals Manufacturer	Maintaining Continuity Despite Our Size	Diversified Suppliers and Safety Stock
		Fast Response Through Open Communication Adaptability	

Source: Survey Data, 2024

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter outlines the primary findings pertaining to the defined objectives, which encompassed various aspects of TQM practices and operational resilience. Additionally, it offers conclusions and recommendations derived from the outcomes and objectives. Further the suggestions for future researches are also highlighted.

5.2 Summary of Findings

The study aimed at evaluating how total quality management practices influenced operational resilience of the manufacturing SMEs in Nairobi County. From the findings, majority of the manufacturing SMEs in Nairobi are owned by males compared to the females (57 percent for males and 43 percent for females). The majority of the manufacturing SMEs owners age ranges between 36-50 years. One reason why the majority of manufacturing SMEs owners is aged between 36-50 years could be their accumulation of experience and expertise in the industry. The majority of manufacturing SMEs in the study have fewer than 20 employees, accounting for 34.4 percent, while those with 20-50 employees make up 26.9 percent. Companies with 50 or more employees comprise less than 40 percent of the total participants. This distribution may be influenced by various factors. Primarily, the prevalence of startups and micro-enterprises in the manufacturing sector contributes to the dominance of smaller SMEs with fewer than 20 employees. These smaller businesses often emerge from individual entrepreneurs or small teams entering the market with limited resources, concentrating on niche markets or specialized products.

There was a positive and significant association between employee involvement, top management commitment, supplier partnership and customer focus with operational resilience. Supplier partnership showed strong association with resilience compared to other factors. The study reveals a particularly robust association between supplier partnership and operational resilience compared to other TQM factors. This suggests that forging strong, collaborative relationships with suppliers is a critical factor for Nairobi's manufacturing SMEs to navigate disruptions and ensure business continuity. Overall, this

implies that these variables and operational resilience are all interlinked and play crucial roles in the success and sustainability of manufacturing SMEs. When top management is committed to fostering a culture of excellence and resilience within the organization, it sets the tone for the entire workforce. Their commitment ensures that resources are allocated, policies are established, and initiatives are implemented to prioritize resilience-building efforts. This commitment trickles down throughout the organization, motivating employees to actively contribute to resilience-enhancing activities. This "trickle-down" effect underscores the importance of leadership buy-in for successful TQM implementation.

Finally, the results showed TQM practices have a statistically significant difference across the levels of operational resilience among the manufacturing SMEs. These results suggest that employee involvement, top management commitment, supplier partnership, and customer focus significantly influence operational resilience. They all influence operational resilience. The ANOVA tests provide evidence that the differences in operational resilience observed across the groups defined by each independent variable are not due to random variability but are likely attributable to the specific factors associated with each manufacturing SMEs in Nairobi, Kenya.

5.3 Discussions

The study discussed each finding as per the objectives. Total quality management practices were found to be statistically significant factors of operational resilience

5.3.1 Employee Involvement and Operational Resilience

The study found that there was a positive and significant association between employee involvement and operational resilience. This implies that employee involvement plays a critical role in enhancing operational resilience by fostering problem-solving abilities, promoting innovation and adaptability, increasing employee engagement and motivation, facilitating organizational learning and knowledge sharing, improving communication and coordination, and enhancing employee well-being and resilience. By harnessing the collective intelligence and capabilities of its workforce, an organization can build a resilient foundation capable of withstanding and thriving in the face of uncertainty and disruption.

From the analysis, most of the manufacturing SMEs conduct regular training sessions for all employees on handling disruptions, including potential raw material shortages, equipment failures, and natural disasters. These sessions equip employees to identify potential issues and take appropriate actions. This goes beyond simply informing employees about potential issues; it equips them with the knowledge and skills to actively participate in safeguarding operational continuity. They further conduct periodic mock disruption drills to test the preparedness and identify areas for improvement. Employees actively participate in these drills by simulating real-world scenarios and providing feedback. Through the use of real-world situations, these drills provide employees with the opportunity to test their knowledge, practice their responding abilities, and identify areas in which coordination, communication, or response plans need to be improved. A sense of ownership and engagement in maintaining operational resilience is fostered by this active participation. Employees actively participate by simulating scenarios and providing valuable feedback, which helps response strategies to be improved iteratively.

The management regularly communicates the importance of operational resilience to all staff. Additionally, performance reviews include evaluations of employees' contributions to maintaining operational continuity. Regular communication on the significance of operational resilience ensures that every employee is aware of the importance of their contribution to maintaining business continuity. This communication motivates employees to actively participate in resilience initiatives, which promotes a sense of shared responsibility. Employee contributions to operational resilience are incorporated in performance reviews, highlighting this element's significance and encouraging employees to continue enhancing their preparedness and response capabilities.

On disruption management workshops, these workshops educated employees on potential disruptions, mitigation strategies, and their role in maintaining operational continuity. Employees were educated on potential disruptions relevant to their specific industry and roles within the organization, and it also included understanding the nature of disruptions, their potential impact, and early warning signs. Manufacturing SMEs encouraged employee participation in quality circles. These circles facilitated discussions focused on

identifying potential disruptions, brainstorming solutions, and proposing improvements to existing resilience strategies. This ongoing dialogue fostered a culture of continuous learning and adaptation, which is crucial for building long-term resilience. The mock disruptions were conducted to test the preparedness and allow employees to practice their response skills. SMEs effectiveness depended on the nature of the disruption. These simulations allowed employees to practice their response skills in a controlled environment, identifying areas for improvement and enhancing overall response effectiveness. The effectiveness of employee involvement in disruption management was evident. For minor issues like machinery breakdowns, they had a fast response from the in-house maintenance team, highlighting the benefits of proactive training and clear roles. However, larger disruptions required more planning.

The findings of this study is supported by Radović-Marković *et al*., (2017) who opined that resilience in a business context involves anticipating, coping with, adapting to, and recovering from disruptions and changes in the business environment. Before the Covid-19 pandemic, resilience had already become a subject of extensive scholarly exploration. Early contributors to resilience research in the SME domain include Bourletidis and Triantafyllopoulos (2014), who examined the strategies, tactics, and success stories of SMEs during crises. Their findings highlighted strategies such as product and service re-engineering, reducing non-essential production costs, negotiating trade-credit conditions, and collaborating within industry supply chains. While their study focused on non-essential service providers, it did not occur during a national lockdown, leaving uncertainty about the applicability of these strategies in the post-Covid era. Kenya's Covid-19 restrictions hit SMEs harder than larger companies due to their limited capital reserves, smaller asset bases, and consequently, lower productivity levels (Dyduch et al., 2021). Central Bank of Kenya data reveals that the majority of affected businesses belong to the SME sector, constituting 98 percent of all enterprises in the country (Noor, 2020). Additionally, this sector employs over 14 million Kenyans (Nyamboga & Ali, 2021).

5.3.2 Top Management Commitment and Operational Resilience

Top management commitment is crucial for fostering operational resilience within an organization. Top management provides direction by articulating a clear vision and

strategic goals for the organization. This clarity helps align operational activities with overarching objectives, ensuring that resilience-building initiatives are prioritized and integrated into the organizational agenda. This vision is translated into strategic objectives that integrate programs aimed at enhancing resilience within the organization's overall goal. Ensuring that operational operations are in line with these strategic objectives guarantees that everyone's efforts are working toward the common objective of being able to survive and thrive in the face of disruptions.

Top management is responsible for establishing policies and procedures that promote resilience across the organization. This includes implementing risk management protocols, business continuity plans, and crisis response strategies to mitigate potential disruptions and minimize their impact on operations. Such protocols identify potential disruptions, assess their likelihood and impact, and establish mitigation strategies. By proactively addressing risks, organizations can minimize their disruptive potential.

Top management also oversees the creation and implementation of comprehensive business continuity plans (BCPs). Business continuity plans outline critical functions, resources, and the procedures for recovery required to ensure operational continuity in the wake of disruptions. This proactive planning allows organizations to respond swiftly and effectively to minimize downtime and losses. It is also a vital role of the top management to establish clear and well-defined crisis response strategies. These strategies outline communication plans, decision-making protocols, and resource allocation procedures for crisis situations, ensuring a coordinated and effective response during disruptions.

Top management commitment, as defined by Cimatti (2016), encompasses active involvement in critical company aspects, including quality and programs. This commitment facilitates customer satisfaction by empowering staff and enhancing work satisfaction through effective leadership. It ensures that organizational goals and policymaking are tailored to the internal and external environment, and that business processes are interconnected with both internal and external partners (Leksono et al., 2020). Top management's involvement in key company decisions is pivotal, with the success of

such decisions relying heavily on their support and commitment (Zakuan et al., 2012). To uphold quality standards, a well-communicated quality policy and management system must be established, with top management overseeing regular monitoring and assessment of the entire process (Oruma et al., 2014).

The study further found that manufacturing SMEs sustained operational resilience during disruptions, for example in footwear industry. There was use of multiple fabric and accessory suppliers to avoid relying on a single source. This mitigates potential disruptions due to supplier issues or price fluctuations. Firms also maintained a safety stock of critical materials like fabric, buttons, and zippers to buffer against unexpected shortages. This allowed SMEs to continue producing for some time even if there's a delay in receiving new supplies. Their employees were trained in multiple aspects of uniform production, like cutting, sewing, and embroidery. This allowed for flexible deployment during staffing shortages or equipment breakdowns. The commitment of management to the above activity demonstrates leadership by doing, thus enhancing resilience. Another example is that during the global cotton shortage a few years ago, firms were able to quickly switch to a different supplier with minimal disruption by utilizing their existing safety stock and leveraging the cross-trained skills of our workforce. This was made possible by proper guidance and commitment of the top management towards maintaining operational continuity.

5.3.3 Supplier Partnerships and Operational Resilience

The positive correlation between supplier partnership and operational resilience is an indication that supplier partnerships significantly impact operational resilience by enhancing the organization's ability to anticipate, adapt to, and recover from disruptions in the supply chain. Supplier partnerships enable organizations to diversify their supplier base, reducing reliance on a single source and mitigating the risk of supply chain disruptions. By cultivating strong relationships with multiple suppliers, organizations can access alternative sources of supply in case of disruptions such as natural disasters, geopolitical events, or economic fluctuations.

The findings imply that effective supplier partnerships involve collaborative risk management efforts between the organization and its suppliers. By sharing information, conducting joint risk assessments, and developing contingency plans, organizations and suppliers can proactively identify and mitigate potential risks throughout the supply chain, enhancing overall resilience. By openly sharing information about potential risks, demand fluctuations, and production capacities, both parties can anticipate and prepare for disruptions. Joint risk assessments make it possible to fully comprehend any potential vulnerabilities in the supply chain. This collaborative approach encourages the early detection of significant risks. Creating collaborative contingency plans guarantees a coordinated response to disruptions. By doing this, downtime is reduced and operational continuity is maintained.

Maintaining relationships with several reliable suppliers for critical raw materials was essential for SMEs in the chemical manufacturing sector. This involved rigorous supplier selection processes, focusing on factors such as reliability on delivery, quality control, and responsiveness to changing needs. Some SMEs diversified their supplier base to mitigate risk associated with overdependence on a single source. Additionally, firms had to hold safety stock for essential ingredients to buffer against potential shortages. This allowed SMEs to continue production even when there were temporary delays in receiving materials from suppliers. These safety stock levels are typically determined by factors such as lead times, variability in demand, and the criticality of the raw materials.

For example, the Head of Production at Zami Chemicals Limited said that during recent global supply chain disruption, having backup stock of key cleaning agents allowed them to continue producing for their hospital clients uninterrupted. The response time to disruptions is relatively fast due to their open communication channels. They had a core team comprising of the management, the owner, and a senior staff member who regularly discuss potential risks and establish response protocols. This allowed for immediate action and informed decision-making when issues arise. For instance, during a minor equipment malfunction threatening delay of the production, the team quickly identified a workaround solution, minimizing downtime. The team was cross-trained in different production tasks.

This enabled adjustment in production schedules and personnel allocation to overcome staffing shortages or equipment limitations. Firms adopted product mix slightly to prioritize high-demand cleaning agents during periods of limited raw material availability. The research is supported by Alberti et al. (2018) strong supplier partnerships foster flexibility and agility within the supply chain. By collaborating closely with suppliers, organizations can quickly adjust production schedules, alter product specifications, or source alternative materials in response to changing market conditions or unexpected disruptions. This agility enables organizations to maintain continuity of operations and meet customer demand even in challenging circumstances.

Supplier partnerships enable organizations to better meet customer needs and expectations by ensuring timely delivery of high-quality products and services. The aligning of supplier capabilities with customer requirements, organizations can enhance responsiveness and customer satisfaction, strengthening their competitive position and resilience in the marketplace.

5.3.4 Customer Focus and Operational Resilience

Customer focus positively impacts operational resilience by aligning organizational strategies, processes, and resources with the needs and expectations of customers. A customer-focused approach involves actively listening to customer feedback, analyzing preferences, and understanding evolving market trends. Firms can adapt their operations to deliver products and services that meet or exceed customer requirements by gaining insights into customer needs and expectations, thereby enhancing resilience to changes in demand and market conditions.

Customer-focused organizations prioritize building strong relationships with their customers, earning their trust, and fostering loyalty over the long term. By consistently delivering high-quality products, exceptional service, and personalized experiences, organizations can cultivate a loyal customer base that is more resilient to competitive threats and economic downturns. Customer loyalty provides a stable revenue stream and buffers organizations against fluctuations in demand, enhancing overall resilience. Customer satisfaction and brand loyalty are nurtured through the continuous provision of

high-quality products and tailored experiences. This results in a customer base that is more resilient and less likely to migrate to competitors in the face of disruptions. A loyal customer base contributes to a stable revenue stream, even during periods of economic turmoil. This financial stability provides a valuable buffer, allowing the organization to absorb disruptions and maintain operational continuity.

According to Sharabi (2015), customer focus is satisfying both current and future clients' needs by understanding their requirements and providing value they perceive as valuable. Sharabi (2015) states that a customer-focused approach should produce value for customers, who will then become devoted clients who will increase firm profitability. The findings are also in line with the work of Islam et al. (2020) who investigated entrepreneurial self-efficacy, business resilience, and creative work practices in selected food service industries in Kazakhstan. Islam et al. (2020) study revealed that entrepreneurs innovative work behavior was predictive of sustained performance and resilience despite the disruptions caused by Covid-19. Through interviews from the six manufacturing SMEs, crisis management strategies were identified as crucial for SME resilience in the face of disruptive shocks. Consequently, a resilience model that emphasizes customer experience, dynamic learning, financial management, and the redeployment of products and equipment was proposed to enhance adaptability and fast response to disruptions in case any occurred.

5.4 Conclusion

Based on the findings, TQM practices contribute to operational resilience for manufacturing SMEs by improving process efficiency, product quality, risk management capabilities, employee engagement, and supply chain relationships. SMEs can build resilience, adaptability, and sustainability in an increasingly uncertain business environment TQM practices emphasize continuous improvement and optimization of processes by embedding TQM principles into their organizational culture and operations. Implementing TQM principles such as process standardization, waste reduction, and quality control, manufacturing SMEs can streamline their operations, leading to improved efficiency and agility. This enhanced process efficiency enables SMEs to respond more effectively to disruptions and changes in the business environment, thus strengthening their operational resilience.

TQM practices focus on meeting customer requirements and delivering high-quality products consistently. Prioritizing quality assurance, error prevention, and customer feedback integration, SMEs can enhance their product quality and customer satisfaction levels. Satisfied customers are more likely to remain loyal during times of crisis, providing a stable revenue stream and enhancing the SME's ability to withstand disruptions. TQM emphasizes the importance of proactive risk management and preventive measures. Through techniques like root cause analysis, manufacturing SMEs can identify potential risks and vulnerabilities in their operations. Addressing these risks early on and implementing robust mitigation strategies, SMEs can build resilience against unforeseen events and minimize their impact on business continuity.

TQM practices promote a culture of employee involvement, empowerment, and continuous learning. Manufacturing SMEs can tap into their workforce's collective expertise and creativity by fostering a supportive work environment where employees are encouraged to contribute ideas, identify problems, and participate in decision-making processes. Engaged and empowered employees are more adaptable to change, more willing to collaborate, and better equipped to handle unexpected challenges, thereby enhancing the organization's overall resilience.

TQM encourages strong partnerships and collaboration with suppliers and other stakeholders in the supply chain. Adopting practices such as supplier quality management, collaborative product development, and long-term relationship building, SMEs can create a resilient supply network. These relationships provide access to alternative sources of supply, shared resources, and mutual support during disruptions, thereby reducing dependency on single suppliers and enhancing the SME's resilience to supply chain disruptions.

5.5 Policy Recommendations

Improving operational resilience in manufacturing SMEs involves several approaches that leverage various aspects of the organization, including employee involvement, top management commitment, supplier partnerships, and customers focus. By integrating these

strategies into their operations, manufacturing SMEs can strengthen their operational resilience and adaptability in the face of uncertainty, disruptions, and changing market conditions.

Regarding the results, this study suggests that;

Manufacturing SMEs need to involve employee by providing comprehensive training programs to enhance employees' skills and knowledge related to resilience-building practices, such as problem-solving, decision-making, and adaptability. Also, employees should be involved by encouraging them to actively participate in decision-making processes and contribute their ideas for process improvement and risk mitigation. Empowered employees feel more invested in the success of the organization and are better equipped to handle challenges.

Establish open communication channels that allow employees to voice concerns, share feedback, and collaborate on solutions. Regular team meetings, suggestion boxes, and employee surveys can facilitate transparent communication and foster a culture of collaboration and resilience. Top management should clearly communicate their commitment to resilience-building initiatives and lead by example. When managers prioritize resilience and demonstrate their dedication to continuous improvement, employees are more likely to embrace these values. Allocate adequate resources, including budget, time, and personnel, to support resilience-building efforts. Top management should ensure that sufficient resources are allocated to training programs, technology investments, and risk management activities.

Integration with Strategy: Embed resilience objectives into the organization's strategic planning process. Align business goals with resilience goals to ensure that resilience becomes a core component of the company's long-term strategy. Manufacturing SMEs need to work closely with suppliers to identify and mitigate potential risks in the supply chain. Establish collaborative risk management processes that involve sharing information, conducting joint risk assessments, and developing contingency plans. Also may reduce dependency on a single supplier by diversifying the supplier base. Cultivate relationships with multiple suppliers for critical components or materials to minimize the impact of

disruptions from any single source. Manufacturing SMEs may build strong; long-term relationships with key suppliers based on trust, mutual benefit, and shared goals. Invest in nurturing these partnerships through regular communication, performance evaluations, and joint problem-solving efforts.

Manufacturing SMEs improve operational resilience through customer focus by conducting market research and gather feedback to understand customer preferences, expectations, and changing needs. Use this information to tailor products and services to meet customer demands effectively.

Manufacturing SMEs may develop responsive customer service processes that enable quick resolution of issues and effective communication during disruptions. Provide multiple channels for customers to reach out for support and assistance. They may focus on building strong relationships with customers based on trust, reliability, and value-added services. Loyal customers are more likely to remain with the company during challenging times and may even provide valuable support and referrals.

5.6 Theoretical contribution

The positive correlation between Total Quality Management (TQM) practices and operational resilience has implications for both Dynamic Capabilities Theory (DCT) and Resource Orchestration Theory**.** TQM practices can function as dynamic capabilities of these manufacturing SMEs for operational resilience. By fostering employee involvement, enhancing strong supplier relationships, the top management being committed and the firm focusing on customer needs and requirement, allows firms to sense, seize, and reconfigure resources in response to disruptions. This extends the understanding of DCT in the context of resilience.

Further, it is a reality that resources (Human, technological and financial) are scarce for many of these SMEs. Therefore, effectively orchestrating these resources is crucial and important for navigating challenges and building resilience. This contributes to ROT by emphasizing the context-specific nature of resource orchestration, where maximizing existing resources takes precedence.

5.7 Practical Contribution

The contribution of a positive correlation between Total Quality Management (TQM) practices and operational resilience has profound implications for organizational practice. Manufacturing firms should strategically align TQM practices with resilience-building initiatives to enhance overall organizational effectiveness. This involves integrating TQM principles such as continuous improvement, customer focus, and employee involvement into resilience strategies and processes. Aligning TQM practices with resilience goals, organizations can leverage their existing quality management infrastructure to strengthen their ability to anticipate, adapt to, and recover from disruptions. Manufacturing firms should prioritize continuous improvement efforts across quality and resilience dimensions. This involves systematically identifying opportunities for improvement, implementing changes based on data-driven insights, and evaluating the impact of interventions on both quality and resilience outcomes.

5.8 Limitations of the Study

Researcher encountered some limitations when conducting this study. Some of the Limitation includes resources, such as time, budget, or access to participants. Some of the respondents did not want to cooperate and this imposed constraint on data collection, and analysis. These resource constraints may have compromised the quality or completeness of the survey study and limit the researcher's ability to address potential limitations effectively.

5.9 Suggestions for Future Research

The study was limit to four aspects of total quality management practices: Employee involvement, top management commitment, supplier partnerships and customer focus. This may limit the applicability of other TQM practices as shown to have an effect on operational performance.

Methodologically, the study focused on manufacturing SMEs in Nairobi county and it may be difficult to generalize these findings to other manufacturing SMEs located in other parts of Kenya.

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APPENDICES

Appendix I: Introductory Letter

Ole Sangale Rd, Madaraka Estate,
P.O Box 59857 00200, Nairobi, Kenya.
Cell: +254 703 414/6/7, Twitter: @SBSKenya
Email: info@sbs.ac.ke or vist www.sbs.strathmore.edu

Strathmore UNIVERSITY
BUSINESS SCHOOL

9th February 2024

To Whom It May Concern,

RE: FACILITATION OF RESEARCH – STACY WAMBUA

This is to introduce Wambua, Stacy Ngenyi who is a Master of Commerce (MCOM) Student at Strathmore University Business School, admission number MCOM/150125. As part of our MCOM Programme, Stacy is expected to do applied research and undertake a project. This is in partial fulfilment of the requirements of the MCOM course. To this effect, Stacy would like to request appropriate data from your organization.

Stacy is undertaking a research paper on **"Effect of Total Quality Management Practices on the Operational Resilience of Manufacturing SMEs in Nairobi - Kenya."** The information obtained shall be treated confidentially and shall be used for academic purposes only.

Our MCOM Programme seeks to establish links with industry, and one of these ways is by directing our research to areas that would be of direct use to industry. We would be glad to

share our findings with you after the research, and we trust that you will find them of great interest and of practical value to your organization.

We appreciate your support and shall be willing to provide any further information if required.

Yours sincerely,

Njoki Kiagiri

Manager – Graduate Programmes

Strathmore University Business School.

Strathmore Business School is a Proud member of;

Association of African Business Schools AABS EFMD AACSB

Appendix II: Questionnaire

Part A: BACKGROUND INFORMATION

Please select the option that best describes your status for each of the following questions.

1. Which of the following best characterizes your gender?

   Male ( )

   Female ( )

2. Which of the following best represents your age group?

   Below 35 years ( )

   36 - 50 ( )

   Over 51 years ( )

3. What is your role in the firm?

4. How long has the organization been in operation?

   Below 5 years ( ) 11-19 years ( )

   5 - 10 years ( ) Over 20 years ( )

5. How many employees work for this company??

   Less than 20 ( ) Between 51 - 100 ( )

   Between 20 - 50 ( ) Above 100 ( )

6. What is the nature of your manufacturing SME's business?

   Building and construction ( ) Leather and footwear ( ) Paper and Board ( )

   Chemical and allied ( ) Metal and allied ( ) Automotive ( )

   Energy and Electrical ( ) Pharmaceuticals ( ) Food and Beverages ( )

   Agriculture ( ) Textiles and apparels ( )

   Plastics and rubber ( ) Timber, wood and Furniture ( )

Part B: OPERATIONAL RESILIENCE OF MANUFACTURING SMEs

Please indicate with a tick (√) or across (×) in the table with a scale of

5= strongly agree 4= Agree 3= neither agree nor disagree 2= Disagree 1= strongly Disagree

	Statement on Operational Resilience	**1**	**2**	**3**	**4**	**5**
1	The organization maintains continuity of operations well during disruptions or crises					
2	The organization's response time to unexpected disruptions is fast					
3	The organization has the ability to be flexible in adapting to changes in the business environment					

PART C: TOTAL QUALITY MANAGEMENT ADOPTION IN MANUFACTURING SMEs

Please indicate with a tick (√) or across (×) in the table with a scale of

5= strongly agree 4= Agree 3= Neither agree nor disagree 2= Disagree 1= Strongly Disagree

Employee Involvement	**1**	**2**	**3**	**4**	**5**
The organization often involves employees to participate in training sessions related to handling disruptions and improving operational resilience					
The organization involves employees in decision-making processes related to operational resilience					
Top management commitment					
The top management actively participates in managerial activities to enhance operational resilience					
The top management understands well the operational aspects contributing to resilience					
Supplier partnerships					
The communication channels between the organization and its suppliers during disruptions are satisfactory					
The organization's key suppliers are reliable and trustworthy to support during challenging periods					
Customer focus					
The organization provides sufficient capacity to meet customer demands during disruptions					
The organization frequently seeks feedback from customers to enhance operational processes					

Appendix III: Interview Schedule

EFFECT OF TOTAL QUALITY MANAGEMENT PRACTICES ON THE OPERATIONAL RESILIENCE OF MANUFACTURING SMEs IN NAIROBI – KENYA

Introduction.

Thank you for your participation in this interview. The purpose of this interview is to acquire comprehensive knowledge about operational resilience and Total Quality Management (TQM) adoption among manufacturing SMEs in Nairobi, Kenya. Your perspectives are essential in understanding the issues and practices in this sector.

PART A: BACKGROUND INFORMATION

1. Could you provide some background information about yourself? What is your role in the company?
2. How long has the organization been in operation, and how many individuals work for it?
3. Could you explain the nature of your manufacturing SME's business? Which sector does it primarily serve?

PART B: Operational Resilience of Manufacturing SMEs

1. Based on your experience, how effectively does the organization maintain operational continuity during disruptions or crises? Can you give examples?
2. How would you rate the organization's response time to unforeseen disruptions? Is it fast, slow, or somewhere in between? Why?
3. In your opinion, does the organization demonstrate flexibility in adjusting to changes in the business environment? How is this flexibility demonstrated?

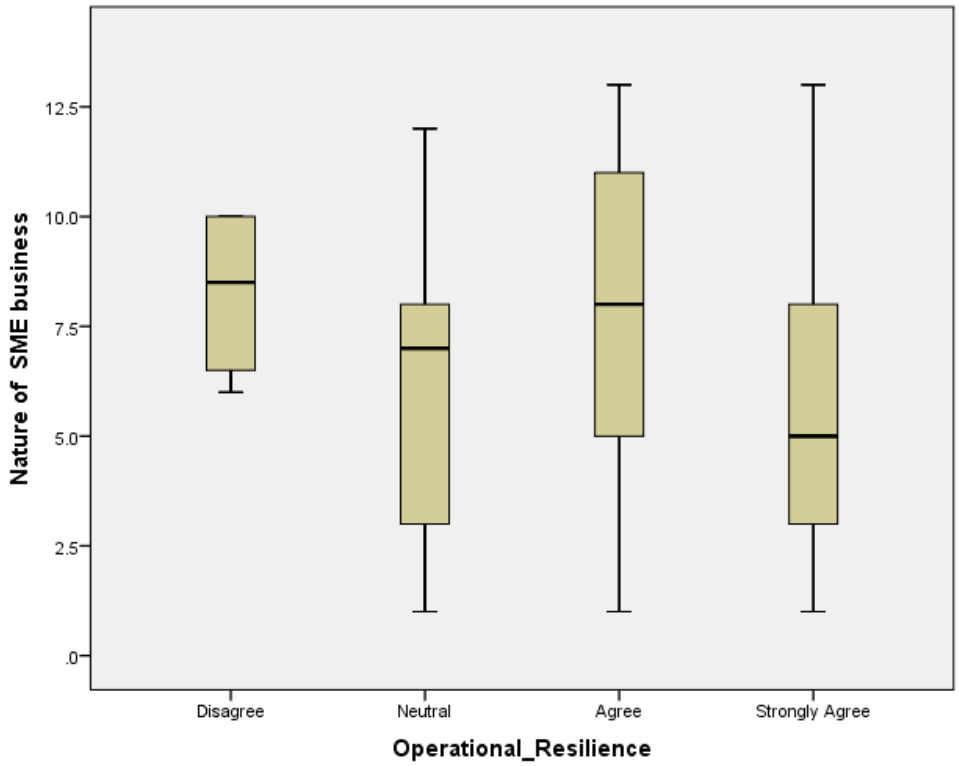
PART C: Total Quality Management adoption in Manufacturing SMEs

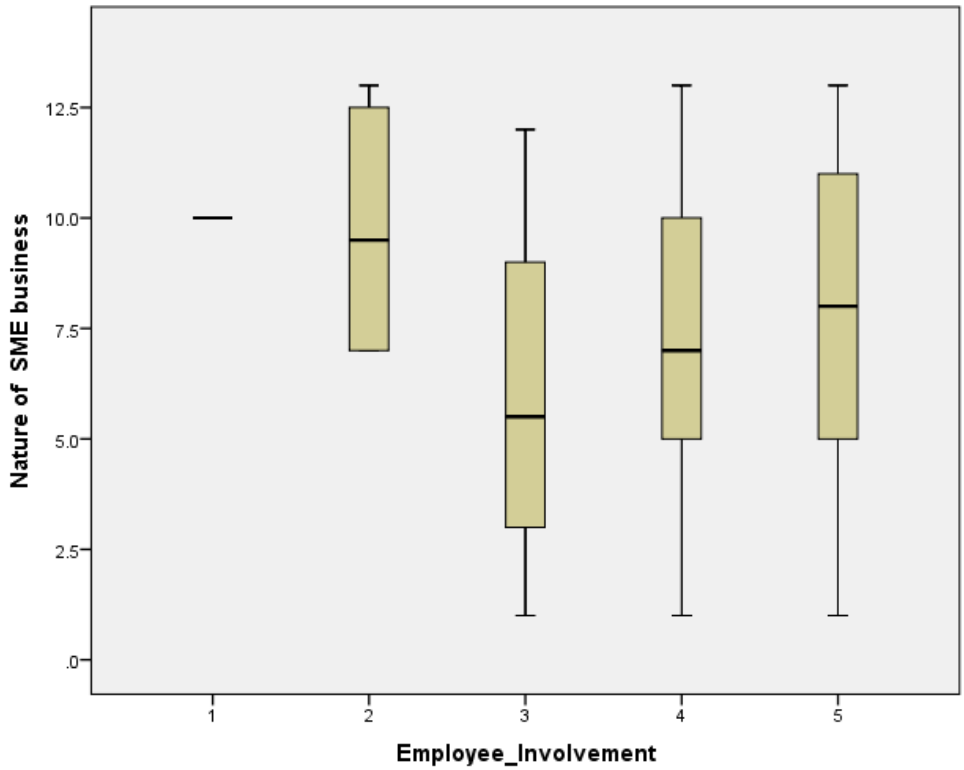
1. Regarding employee involvement, could you share examples of how employees are involved in training sessions related to handling disruptions and improving operational resilience?
2. How does top management demonstrate its commitment to improving operational resilience within the organization? Can you share solid examples?
3. What is the nature of the organization's collaboration with suppliers during disruptions? Are the communication channels satisfactory, and are the suppliers reliable?
4. How does the organization prioritize customer focus amid disruptions? Can you expound on the organization's ability to meet client needs and collect feedback?

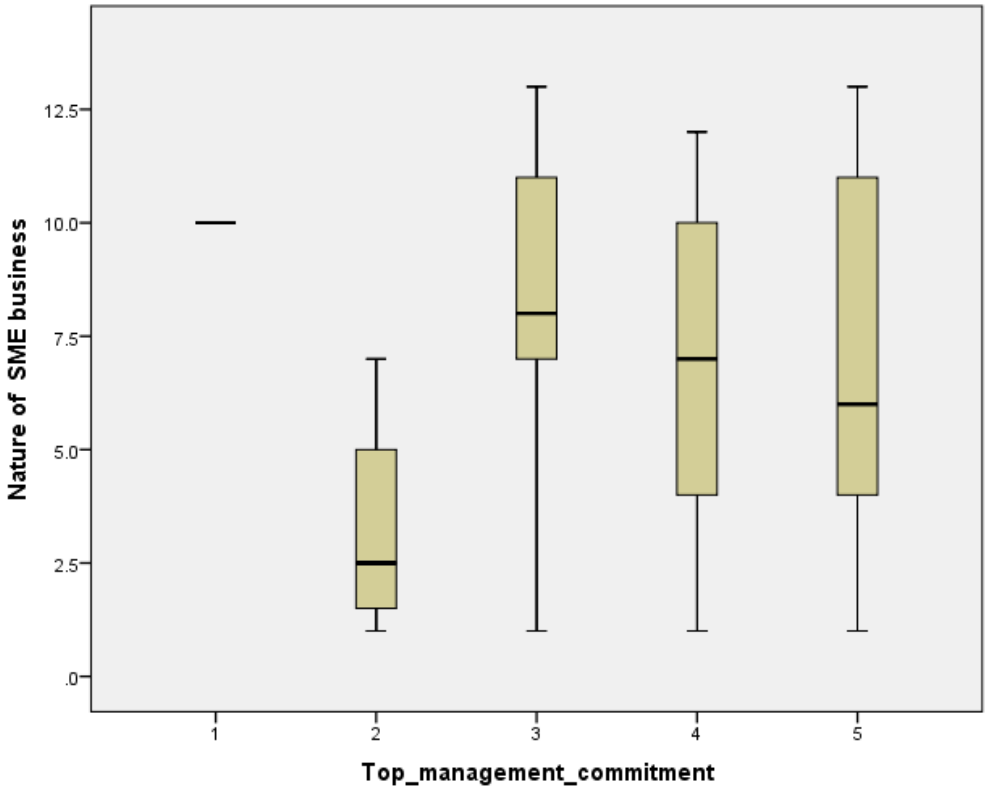
Conclusion:

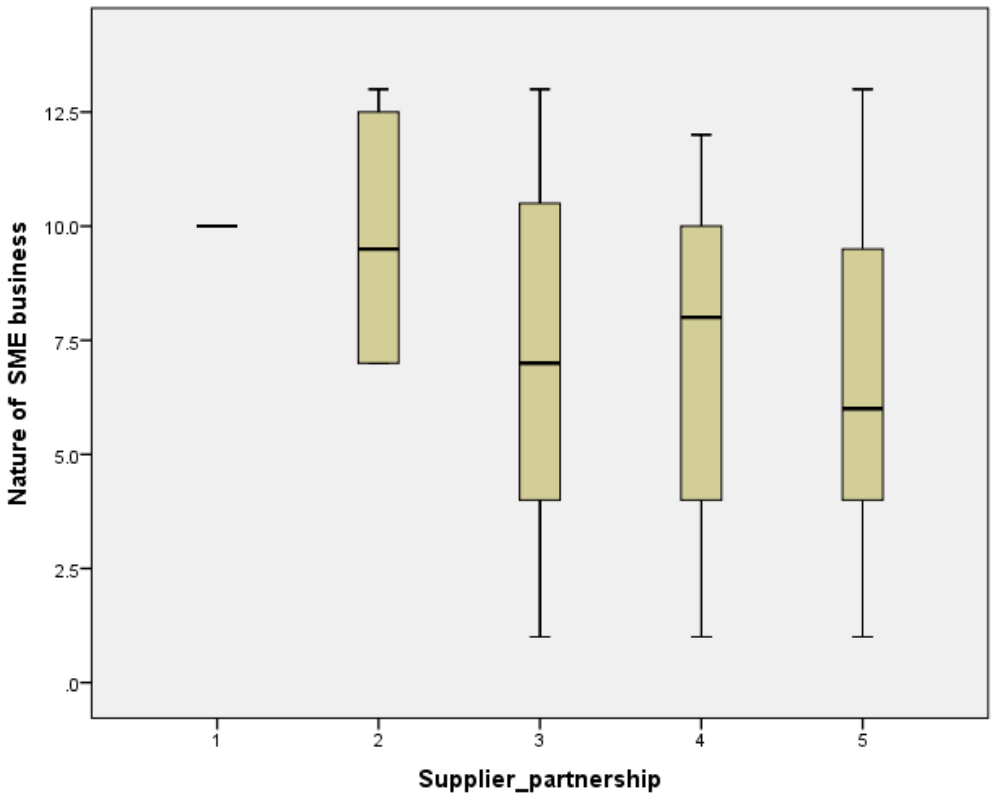
Thank you for sharing your insights and experiences with us today. Your input will contribute to our understanding of operational resilience and TQM adoption in manufacturing SMEs. If you have any additional comments or suggestions, please feel free to share them.

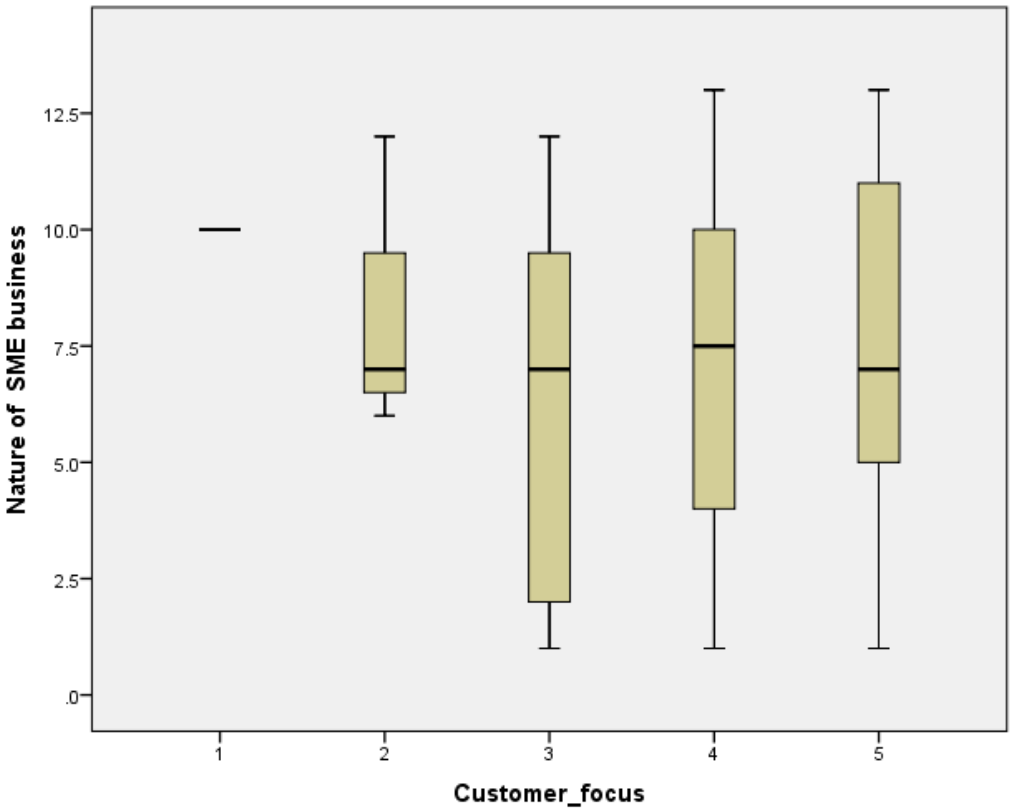
Appendix IV: Boxplots for Checking Outliers






Nature of SME business
12.5
10.0
7.5
5.0
2.5
.0
1
2
3
4
5
Top_management_commitment


Nature of SME business
12.5
10.0
7.5
5.0
2.5
.0
1
2
3
4
5
Supplier_partnership


Nature of SME business
12.5
10.0
7.5
5.0
2.5
.0
1
2
3
4
5
Customer_focus

Appendix V: List of Registered Manufacturing SMEs for The Year 2018

1.BUILDING AND CONSTRUCTION

Brima Building & Construction Limited

Ganatra Plant & Equipment Ltd

Lee Construction Ltd

Rupra Construction Co.

Sobetra Kenya

Warren Enterprises Ltd

2. CHEMICAL & ALLIED PRODUCTS

Chemical and school supplies

Dalco Kenya Ltd

Dentex Ltd

FaramEa Ltd

Impact Chemicals Ltd

Oriental Products Limited

Pantel Chemicals Ltd

Tropikal Ltd

Zami Chemicals Ltd.

3. ENERGY & ELECTRICAL

Kenmet Ltd

Master Power Systems Ltd

Ocean Energy Ltd

Powerpoint Systems EA Ltd

4. AGRICULTURE

Agriner Agricultural Development

Alpha Grain Millers Ltd

Bdelo Ltd

Kandia Fresh Produce Suppliers

Minjingu Organic Fertilizers Ltd

5. LEATHER & FOOTWEAR

Adix shoes Limited

Anchor Footwear

Leather Masters Ltd

Leather Trading Co.

Maridadi Seasons Handcraft

Palm Prints African Artifacts

Reddamac Leather Center

Sanabora Design House Ltd

Three Sixty-Five Events

Zeeban Designs

6. METAL & ALLIED PRODUCTS

General Aluminum Fab Ltd

Toolcrafts Limited

7. PHARMACEUTICALS

Biodeal Laboratories Limited

Cosmos Pharmaceutical Limited

Dawa Pharmaceuticals Ltd

Didy Pharmaceutical

Diversey Lever

Elys Chemical Industries Ltd

Globe Pharmacy Ltd

High Chem East Africa Ltd

Mac’s Pharmaceutical Ltd

Manhar Brothers (Kenya) Ltd

NextGen Pharmaceuticals (K) Ltd

Novartis Rhone Poulenic Ltd

Orange Pharma Ltd

Pharmaceuticals Manufacturing Co (K) Ltd

Pharmaceutical Products Limited

Pharma Branding Ltd

PSM Pharmaceuticals Ltd

RangeChem Pharmaceuticals Ltd

Regal Pharmaceuticals Ltd

Sai Pharmaceuticals Ltd

Sphinx Pharmaceutical Ltd

Sunpar Pharmaceutical Ltd

Syner-Med Pharmaceuticals (Kenya) Ltd

Transwide Pharmaceuticals Ltd

United Pharma (K) Ltd

Universal Pharmaceutical Limited

Wessex Pharmaceuticals Limited

8. TEXTILES & APPARELS

Alpha Woolens Ltd

Bhupco Textile Mills Ltd

Bunny Ltd

Fine Spinners Ltd

Joyknitts Garments Ltd

Kawa Garments Limited

LVL Apparels

Masken Garments Limited

Midco Textiles Ltd

Omega Apparels Ltd

Oriental Mills Ltd

Polo Industries Ltd

Sunflag Textile and Knitwear Manufacturing Ltd

Supra Textile Ltd
United Textile Industry (K) Ltd

9. PAPER & BOARD PRODUCTS
Flora & Fame Paper Company
Mega paper and Boards Ltd
Paperbags Limited

10. AUTOMOTIVES
Auto Aunciliaries Ltd
Chui Auto Springs Industries Ltd
Monte Auto Services

11. FOOD & BEVERAGES
Afribon
Africa Tea Brokers Ltd
Afrimac Nut Company Ltd
Alpha Fine Foods Ltd
Bakers Corner Ltd
Bio Food Products Ltd
Candy Kenya Ltd
Capel Food Ingredients
Chirag Kenya Ltd
Edibowl Foods Limited
Energy Foods Ltd
Joy Food Industries
Melvin Marsh International Ltd
Mhogo Foods Limited
OZ Foods & Beverages Ltd
Peafoods Processing Company Ltd
Suntory Beverage & Food Kenya Ltd

Tropikal Ltd

Viva Global

Winnie’s pure health

12. PLASTICS & RUBBER

Coninx Industries Limited

R & R Plastic Ltd

13. TIMBER, WOOD & FURNITURE

Complast industries

Furniture Elegance Ltd

Panesar’s Kenya Ltd

The Phoenix Ltd

Appendix VI**:** Ethical Approval

Strathmore UNIVERSITY

13th March 2024

Ms Wambua Stacy,
stacy.wambua@strathmore.edu

Dear Ms Wambua,

RE: Effect of Total Quality Management Practices on the Operational Resilience of Manufacturing SMEs in Nairobi - Kenya

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-masters** research proposal. Your application reference number is **SU-ISERC2025/24.** The approval period is from **13th March 2024 to 12th March 2025.**
This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification.
iv. Any changes anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-ISERC within 72 hours.
v. Clearance for the export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days of completion of the study to SU-ISERC.

Before commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) https://research-portal.nacosti.go.ke/ and obtain other clearances needed.

Yours sincerely,

Mr Ambrose Rachier,
Chairperson; SU-ISERC

STRATHMORE UNIVERSITY INSTITUTIONAL SCIENTIFIC AND ETHICAL REVIEW COMMITTEE
(SU-ISERC)
13-Mar-2024
Email:ethicsreview@strathmore.edu
P.O BOX 59857-00200
NAIROBI-KENYA

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email admissions@strathmore.edu www.strathmore.edu

Appendix VII: NACOSTI Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No**409417**

Date of Issue: **18/March/ 2024**

RESEARCH LICENSE

This is to Certify that Ms. Stacy Ngenyi Wambua of Strathmore University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: Effect of Total Quality Management Practices on the Operational Resilience of Manufacturing SMEs in Nairobi - Kenya for the period ending: 18/March/2025.

License No: **NACOSTI/P/24/33943**

409417

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of thi
Scan the QR Code using QR scanner application.

See overleaf for conditions